

**Facilitating flexible, enquiry-based experiential learning through  
an accessible, three-dimensional virtual learning environment  
(3DVLE)**

Final Report 2012

*Lead institution:*

University of South Australia (UniSA)

*Partner institutions and project team members*

*University of South Australia*

Dr Denise Wood (project leader)

Associate Professor Gerry Bloustien (project leader)

Dr Rosie Kerin

Mr Frank Kurzel

Ms Jen Seifert

Associate Professor Tony Spawton

Ms Dale Wache

*Edith Cowan University*

Professor Lelia Green

*Monash University*

Professor Ilana Snyder

Dr Michael Henderson

*RMIT University*

Associate Professor Jenny Sim

*University of Sheffield, UK*

Professor Jackie Marsh

*The University of Sydney*

Associate Professor Ian Maxwell

Winthrop Professor Mark Israel ( The University of Western Australia)

Professor Des Butler (Queensland University of Technology)

Professor Ieva Stupans (University of New England)

*Report authors:*

Dr Denise Wood

Associate Professor Gerry Bloustien

<http://www.unisanet.unisa.edu.au/3dvle>

Support for this project has been provided by the Australian Learning and Teaching Council Ltd., an initiative of the Australian Government. The views expressed in this report do not necessarily reflect the views of the Australian Learning and Teaching Council or the Australian Government.

This work is published under the terms of the Creative Commons Attribution-Noncommercial-ShareAlike 3.0 Australia Licence. Under this Licence you are free to copy, distribute, display and perform the work and to make derivative works.

**Attribution:** You must attribute the work to the original authors and include the following statement: Support for the original work was provided by the Australian Learning and Teaching Council Ltd, an initiative of the Australian Government Department of Education, Employment and Workplace Relations.

**Noncommercial:** You may not use this work for commercial purposes.

**ShareAlike:** If you alter, transform, or build on this work, you may distribute the resulting work only under a licence identical to this one.

For any **reuse or distribution**, you must make clear to others the licence terms of this work. Any of these conditions can be waived if you obtain permission from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by-nc-sa/3.0/au/> > or send a letter to: Creative Commons, 171 Second Street, Suite 300, San Francisco, CA 94105, USA

**Requests and inquiries** concerning these rights should be addressed to:  
Office for Learning and Teaching  
Department of Industry, Innovation, Science, Research and Tertiary Education\_  
GPO Box 9880, Location code N255EL10  
Sydney NSW 2001

[learningandteaching@deewr.gov.au](mailto:learningandteaching@deewr.gov.au)

2012

ISBN: 978-1-74361-209-5 [PRINT]

ISBN: 978-1-74361-210-1 [PDF]



## Acknowledgements

Many thanks to the following academic experts who contributed their time and expertise in responding the scenarios that helped to inform the development of the guidelines for teaching in 3D virtual worlds:

Professor Peter Albion, Professor (Educational Technology), Faculty of Education, University of Southern Queensland

Professor Matthew Allan, Professor of Internet Studies, Department of Internet Studies, Curtin University

Dr Gary Allen, Senior Manager, Research Ethics and Integrity, Griffith University, Australia

Dr Tracey Bretag, Director of Global Experience, Division of Business, University of South Australia, Australia

Professor Elizabeth A. Buchanan, Professor and Director, Center for Applied Ethics, University of Wisconsin-Stout, United States

Professor Des Butler, Professor of Law, Faculty of Law, Queensland University of Technology

Mr Robert Chalmers, Managing Director ARI (Adelaide Research and Innovation) Pty Ltd, The University of Adelaide

Dr Sharon Collingwood, Department of Women's Studies, Ohio State University

Professor Eritus Norman Coombs, CEI of Easy Access to Software and Information (EASI), California

Associate Professor Barney Dalgarno, Associate Professor, and Sub Dean Learning and Teaching, Faculty of Education, Charles Sturt University

Ms Megan Deacon, Copyright Advisor, Client Services Library, Monash University

Dr Melissa de Zwart, Associate Professor, Adelaide Law School, The University of Adelaide, Australia.

Dr Julianne East, Lecturer in Academic Language and Learning, Curriculum Teaching and Learning Centre, La Trobe University, Australia

Dr Helen Farley, Senior Lecturer, Australian Digital Futures Institute, University of Southern Queensland Toowoomba

Mr Scott Grant, Assistant Lecturer, School of Asian Languages and Studies, Monash University

Ms Suanne Gregory, Lecturer, Faculty of the Professions, School of Education, University of New England

Assistant Professor Wade Halvorson, Marketing, UWA Business School, The University of Western Australia

Henry Jenkins, Provost Professor of Communication, Journalism, and Cinematic Arts, joint professorship at the USC Annenberg School for Communication and the USC School of Cinematic Art

Mr Mark Lee, Adjunct Senior Lecturer, School of Education, Charles Sturt University Charles Sturt University



Ms Annie Lennox, Senior Coordinator, RMIT Copyright Management Service, RMIT University Library, Royal Melbourne Institute of Technology

Assistant Professor Lee Partridge, Higher Education Development, Centre for Advancement of Teaching and Learning, The University of Western Australia, Australia.

Ms Margaret Pembroke, Information Management Officer, Southern Cross University Library, Southern Cross University

Dr Barbara Spears, Senior Lecturer, School of Education, University of South Australia

Mr Damian Sweeney, Senior Learning and Teaching Consultant, Learning Environments, The University of Melbourne

Ms Janyth Ussery, Texas State Technical College

Ms Dale Wache, Academic Developer, Learning and Teaching Unit, University of South Australia

Dr Ian Warren, Senior Lecturer in Criminology, School of Humanities and Social Sciences, Deakin University

Dr Julie Willems, E-Learning Designer/Educational Developer, Department of Rural and Indigenous Health, Monash University

We would also like to gratefully acknowledge the support provided by the following members of the UniSA editorial committee in the final preparation of this report:

Leah Boyce

Gemma Broomfield

Jessica De Garis

Crystal Doyle

Catherine Howes

Zoe Reid



## Executive summary

This project addresses the limitations of existing three-dimensional virtual learning environments (3DVLEs) and aims to raise awareness of the potential of 3DVLEs as generic pedagogical tools for flexible, experiential and community-based disciplinary and cross-disciplinary learning in simulated environments.

The project has involved collaboration between the University of South Australia (UniSA), Edith Cowan University (ECU), Monash University, RMIT, The University of Sydney, and the University of Sheffield (UK), in consultation with accessibility specialists, legal advisors and human rights representatives.

The key objectives of the project are to

- design and develop an accessible, open-source 3DVLE as a generic pedagogical tool for flexible, experiential and community-based disciplinary and cross-disciplinary learning in simulated environments
- develop source code based on the same open-source standards as popular 3D virtual environments (3DVEs) such as *Second Life*
- ensure the 3DVLE developed using open-source standards integrates a range of accessibility features that are currently not supported by 3DVEs
- provide a range of accessible open-source 3DVLE tools enabling academics to adapt 'real life' approaches to the creation of interactive activities designed to maximise learner engagement
- develop guidelines to address research ethics, probity, student behaviour, access and equity and intellectual property (IP) responsibilities, as well as case studies of best practice across disciplines to guide academics in designing environments that facilitate learner engagement and experiential learning
- release the deliverables from the proposed project to the higher education the project has also demonstrated quality learning and teaching through course development, interactive learning and student engagement in an accessible 3DVLE.
- community, allowing universities access to the benefits of 3DVLEs.

In addition, this project has:

- contributed to the growing body of knowledge about the pedagogical benefits of 3DVLEs in higher education through 16 peer reviewed publications and more than 20 conference presentations, workshops and poster sessions
- raised awareness among educators and software developers of the importance of and strategies for ensuring that teaching in 3DVLEs is accessible for students from diverse backgrounds, including those with disabilities
- led to new collaborations both nationally and internationally, which in turn have resulted in further funding obtained by partner institutions to progress the outcomes of this project across the health, computer science, higher education, high school and primary sectors.



## List of shortened forms

Ajax	Asynchronous JavaScript and XML
ALTC	Australian Learning and Teaching Council Ltd
APIs	Application programming interfaces
ATs	Assistive technologies
DOM	Document Object Model
IRC	Internet relay chat
3DVE	Three-dimensional virtual environment
3DVLE	Three-dimensional virtual learning environment
WAI-ARIA	Web Accessibility Initiative Accessible Rich Internet Applications Suite
W3C	World Wide Web Consortium
W3C WCAG 2.0	W3C Web Content Accessibility Guidelines 2.0



# Contents

1. Introduction	5
2. Scope of investigation	7
2.1 Objectives	7
2.1.1 Design and develop a 3DVLE	7
2.1.2 Develop guidelines for academics	7
2.2 Approach	7
2.2.1 Design and develop a 3DVLE	8
2.2.2 Develop guidelines for academics	8
3 Outcomes	9
3.1 Design and develop a 3DVLE	9
3.1.1 Ethnographic research	9
3.1.2 Existing accessibility solutions (review of literature)	10
3.1.3 Design specifications	11
3.1.4 Design of accessible 3DVLE	12
3.2 Develop guidelines for academics	15
3.2.1 Case studies	15
3.2.2 Summary of case study findings	31
3.2.3 Email survey	31
3.2.4 Expert responses to hypothetical scenarios	37
3.2.4.1 Ethics	40
3.2.4.2 Student probity	45
3.2.4.3 Student behaviour	50
3.2.4.4 Access and equity	53
3.2.4.5 Intellectual property (IP)	57
4 Impacts	62
4.1 Ethical issues	62
4.2 Legal and intellectual property	62
4.3 Technology	63
4.4 Cost	63
4.5 Accessibility	63
5 Success of investigation	65
5.1 Factors critical to success	65
5.2 Factors that impeded success	65
6 Applicability to other institutions	67



7 Dissemination	68
7.1 Book chapters	68
7.2 Peer-reviewed journal publications	68
7.3 Web links and social media profile	69
7.4 Invited keynotes and plenary addresses	69
7.5 Peer-reviewed conference presentations	69
7.6 Conference papers/posters/abstracts	70
7.7 Other presentations, seminars, exhibitions	71
7.8 Media releases/statements/interviews	73
7.8.1 2011	73
7.8.2 2010	73
7.8.3 2009	75
7.8.4 2008	75
7.9 Publications in progress	75
8 Linkages	77
8.1 Links with other projects/fellowships in ALTC priority areas	77
8.2 Disciplinary and interdisciplinary linkages	77
9 Evaluation	78
9.1 Formative review	79
9.2 Summative review	81
9.2.1 Testing Web 2.0, chat and presentation	81
9.2.2 Testing AccessGlobe	82
9.2.3 Conclusion	83
9.3 Evaluation by users with disabilities and expert developers – accessibility solutions	83
9.3.1 Accessibility of the AccessGlobe viewer	83
9.3.2 Accessibility of Web 2.0 interface to the 3DVLE	88
9.3.3 Overview of independent evaluations of accessibility solution	95
9.4 Summative evaluation conducted by Professor Ron Oliver (Edith Cowan University, August 2011)	96
10 References	98
11 Appendices	104





# 1 Introduction

3D virtual environments such as *Second Life* and open source 3D virtual world platforms such as *OpenSim* have attracted growing interest from educators who are keen to engage their students in a game-like environment that offers the potential for increased flexibility, enhanced collaborative opportunities and a safe environment for experiential learning activities (see for example Gregory et al. 2010). These environments are increasingly being used for a range of activities including presentations, discussions, role plays and simulations, historical re-enactments, games design, dramatic performances, creative arts and business modelling.

While the use of virtual learning environments has been shown to enhance learning through the provision of flexible, just-in-time information and the exchange of knowledge (Wichert 2002), it is evident that mere access to teaching materials is unlikely to engage our 'digital native' learners who respond best to multi-modal forms of delivery (Oblinger and Oblinger 2005; Prensky 2009, 2001). Furthermore, text based learning environments are not sufficient to facilitate the development of students' deeper knowledge of and skills (Rouvrais and Gilliot 2004) and are limited in their ability to capture the social dimension that characterises learning in the real world (Lombardi and McCahill 2004).

On the other hand, 3D virtual environments enable learners to interact with information from a first-person perspective (Dickey 2005) and offer unique opportunities for students to engage in the kinds of simulated learning experiences in fields as varied as health science (Mili et al. 2008; Cooper 2007), fashion design (Polvinen 2007), hospitality and tourism (Penfold 2008), collaborative story telling (Bakioğlu 2007), second language acquisition (Henderson, Huang, Grant, & Henderson, 2009), business (Bloomfield 2007) and experiential learning activities (Mason 2007). Such activities can prepare students for future employment without the constraints of 'real world' industry placements (Chen 2005). Moreover, as several authors note, 3D virtual worlds such as *Second Life* can facilitate communication skills (Robbins 2007), collaboration and constructivism (Clark and Maher 2003), and can also increase students' understanding of cultural differences and other aspects of diversity (Lee and Christopher 2006).

Despite these reported benefits (Carter 2006), however, environments such as *Second Life* were not designed specifically for this purpose as learning environments. They have become 'all things to all people' (Bloomfield 2008), attempting with difficulty to serve many purposes for many different participants. Very few studies have documented the challenges of adapting these technologies to the teaching and learning curriculum and as Hayes (2006) reminds us, leveraging the benefits of these technologies involves more than providing students with access to the tools. Hayes goes on to caution that participation in learning activities hosted on public servers such as *Second Life* presents 'unforeseen challenges' (p. 159) and depends on 'a complex set of social, economic and legal conditions' (p. 158) that users can only partially control.

Such 'unforeseen challenges' identified from review of the literature include:

- a lack of empirical evidence documenting the pedagogical benefits of teaching and learning within a 3DVLE compared with other forms of online delivery
- the accessibility problems associated with the *Second Life* platform (Brewer cited in Qi 2007; Kawamura cited in Fruchterman 2007; Peters and Bell, 2007; Abrahams 2007; Hansen 2008; Wood and Hopkins 2008)
- legal and Intellectual Property (IP) issues (Mistral 2007a, 2007b; de Zwart,



2007; Coates, Suzor and Fitzgerald 2007)

- ethical considerations relating to teaching, learning and research within 3D virtual learning environments (Buchanan 2011; Rosenberg 2009)
- technology related factors including server stability, technology demands and security concerns (Lee and Warren 2007)
- the costs associated with purchase of virtual land, monthly maintenance and operating within a commercial virtual economy.

Recognising the potential of 3D virtual learning environments (3DVLEs) and also mindful of these possible 'unforeseen challenges', a research team at the University of South Australia purchased a virtual island in *Second Life* in November 2007 to undertake preliminary trials and document the pedagogical benefits as well as the issues in the use of 3D virtual environments for learning. The findings from this preliminary research were then used to support a competitive grant application to the Australian Learning and Teaching Council (ALTC) for this project, which aimed to develop guidelines for the use of 3DVLEs in the undergraduate and graduate curriculum, and to design and develop an open source, accessible 3DVLE platform.

This report describes the objectives, methodology employed and the significant findings from the study, which have informed the development of guidelines for academic staff and their institutions to reflect the new technological environments and the transmission to new and changing disciplinary contexts.



## 2 Scope of investigation

### 2.1 Objectives

The project addresses the limitations of existing three-dimensional virtual learning environments (3DVLEs) and aims to raise awareness of the potential of 3DVLEs as generic pedagogical tools for flexible, experiential and community-based disciplinary and cross-disciplinary learning in simulated environments.

#### 2.1.1 Design and develop a 3DVLE

Key objectives were:

- design and develop an accessible, open source 3DVLE as a generic pedagogical tool for flexible, experiential and community-based disciplinary and cross-disciplinary learning in simulated environments
- develop source code based on the same open source standards as popular 3DVLEs such as *Second Life*
- ensure the 3DVLE developed using open source standards will integrate a range of accessibility features that are currently not supported by 3DVEs
- provide a range of accessible open source 3DVLE tools enabling academics to adapt real life approaches to the creation of interactive activities designed to maximise learner engagement.

#### 2.1.2 Develop guidelines for academics

Key objectives were:

- develop guidelines for teaching in 3DVLEs as well as case studies of best practice across disciplines to guide academics in designing environments that facilitate learner engagement and experiential learning
- release the deliverables from the proposed project to the higher education community, allowing universities access to the benefits of 3DVLEs.

### 2.2 Approach

The two major deliverables for this project were:

1. the development of an accessible open source 3DVLE and associated teaching tools that are accessible to students with disabilities
2. the development of guidelines for academics teaching in 3DVLEs as well as case studies of best practice across disciplines to guide academics in designing environments that facilitate learner engagement and experiential learning.

The research design has involved several stages. Human Research Ethics approval was obtained prior to the commencement of the research.



### 2.2.1 Design and develop a 3DVLE

The design and development of the open source 3DVLE involved the following stages:

- review of the literature to identify the usability/accessibility challenges
- ethnographic research undertaken in *Second Life* involving participant observation of users' interactions and conducting interviews with individuals who identify as disabled in their actual lives
- review of existing accessibility solutions
- development of guidelines for interface design based on the W3C's Web Content Accessibility Guidelines (W3C World Wide Web Consortium, 2008)
- design and development of an open source accessible 3DVLE for use in higher education
- independent usability/accessibility testing of the platform.

### 2.2.1 Develop guidelines for academics

The development of the guidelines relating to teaching and learning in 3DVLEs was informed by the findings of research involving:

- an email survey comprising a series of check-box and open-ended questions addressing a number of aspects relating to ethics, probity, behaviour and equity in the use of virtual worlds in teaching and learning at a university level was distributed via the Australian Virtual Worlds Working Group (160 members across 43 higher education universities) and the *Second Life* Educators' Listserv. Several international educators were also recruited via 'snow ball' sampling, as educators suggested colleagues who would be interested in participating.
- analysis of ten case studies of the use of 3DVLEs across a range of disciplinary fields including media arts, cultural studies, visual literacy ethnography, health sciences, information literacy and higher degrees research
- expert commentary received from academic colleagues in response to five hypothetical scenarios relating to research ethics, student probity, student behaviour, access and equity, and Intellectual Property, which were distributed via email to recognised national and international experts in each of these areas.



## 3 Outcomes

### 3.1 Design and develop a 3DVLE

#### 3.1.1 Ethnographic research

The first stage of the project involved ethnographic research conducted with 'residents' of *Second Life* who identified as having a disability outside the virtual world.

Participants for the ethnographic stage of the study were recruited via a 'notecard' (see Appendix 1) distributed to various disability groups in *Second Life* (See Figure 1). Recruitment notice boards were also set up on Sims (virtual regions) associated with these disability groups. Additional information about the project was available from the website (<http://www.communitywebs.org/3dvle/>) and could be accessed via a link embedded in the recruitment material. Interested individuals who met the criteria were invited to contact the researchers via email or 'in-world' and were provided with additional information. Individuals who met the criteria and agreed to the details provided in the information sheet were required to submit a digitally signed consent form to the researchers 'in-world'.

The main process of data collection involved participant observation and interviews using either text chat or audio-recordings for ease of analysis. The participants were not identified in the transcripts and resulting analysis or research outputs. The data material was made available to any of the participants on request. Participants were also advised that their participation was voluntary and that they could withdraw from the study at any time.



Figure 1: Participant recruitment in *Second Life*





As reported by Hickey-Moody and Wood (2008) our ethnographic research in *Second Life* provided evidence of a new kind of disablement experienced by people with disabilities within the virtual world. While some of the users who identified as disabled outside *Second Life* reported that they navigate the virtual world very successfully and find the virtual experience to be liberating, others reported accessibility challenges and exclusionary practices mirroring those experienced in their actual lives. At the time in which the trials were undertaken, some of these accessibility limitations included the:

- login screen of *Second Life* was not accessible for users who are visually impaired and rely on screen reader software
- local chat window in *Second Life* was not accessible to screen reader software
- user interface of the *Second Life* viewer was not accessible to screen reader software and there was limited support for alternative accessing devices
- need for the tab-index to be incorporated to provide a logical order between links and options
- need for provision of an audio message and a text list of avatars in the vicinity of the user's avatar
- need for an option enabling users to add descriptive labels for all objects and longer descriptions for posters and slides containing text in image format
- need for synchronised streaming captions for videos
- need for text transcriptions for streaming audio.

### 3.1.2 Existing accessibility solutions (review of literature)

A review of the literature focusing on techniques for improving the accessibility of media-rich applications, Web 2.0 technologies and 3DVLEs identified several strategies that designers can adopt to improve the accessibility of Web 2.0 applications. This review was complemented with desktop research into available alternative accessible viewers (the client application required to connect to 3DVLEs such as *Second Life*) and 'in-world' research undertaken in *Second Life* involving interviews with residents who identified as either programmers designing accessibility solutions, or people with disabilities who use customised solutions to improve their ability to navigate the virtual world. The findings from the review of available solutions are reported in this next section.

The review of the literature demonstrated the potential for improving the accessibility of dynamic rich-media applications. In particular we noted the availability of new specifications that can be added to such applications using APIs (extended accessibility application interfaces) and Accessible Rich Internet Applications (ARIA), a specification being brought forward by the W3C Web Accessibility Initiative's (WAI) Protocols and Formats Working Group (2009), which is designed to enable assistive technologies to better represent user interface components and dynamic interactions to the user.

Tim Berners-Lee (2006) also points to the potential of 'marshalling the community' to improve the accessibility of Web 2.0 sites, suggesting in an interview with out-law.com that in the spirit of Web 2.0 collaboration, the community could provide captioning for video blogs. There are already several exemplary initiatives such as Project readOn, a community committed to making online media content to all, which has created a streaming media caption player and provides professional captioning services. YouTube™ video now provides users with the ability to caption



their videos and Google™ has introduced a range of accessibility products and APIs for developers designed to improve user experience.

3DVLEs such as *Second Life* can also be made more accessible to those with physical, sensory and cognitive impairments. There have been some important initiatives, many of which have been developed by the residents of the communities themselves. These include the development of non-graphical based viewers (such as *Radegast*) and the use of Internet Relay Channel (IRC) to enable people with disabilities who cannot attend 'in-world' meetings to participate using a web-based community chat room. Figure 2 shows a *GimpGirl* community meeting conducted in *Second Life*, which is relayed via IRC to the *GimpGirl* community chat room.



**Figure 2:** *GimpGirl* meeting held in *Second Life*

Interviews with residents in *Second Life* also identified the following 'in-world' solutions:

- the *virtual guide dog project* developed by Virtual Helping Hands Inc., which enables users with vision impairments to navigate the virtual world by issuing commands through the chat channel to the virtual dog or cane to find an object or follow an avatar
- the *E.V.A. voice chat advancement system*, which is an 'in-world' voice based application that narrates text displayed in the chat channel
- *Virtual Ability Inc* transcription services such as voice-to-text (V2T) transcription (undertaken manually using typed meaning-for-meaning real-time text) and text-to-voice (T2V) undertaken by transcriptionists who read aloud the text offered by the presenter.

### 3.1.3 Design specifications

Drawing on the research reported in previous sections of this paper, the following essential requirements for the design of accessible 3DVLEs have been identified:

- interface must be able to support a range of inputting devices
- inclusion of styles enabling the customisation of type according to size and colour
- tab-index incorporated to provide a logical order between links and options



- text-to-voice feature for chat
- provision of an audio message and a text list of avatars in the vicinity
- option to turn off graphics
- requirement for users to add descriptive label for all objects and longer descriptions for posters and slides containing text in image format
- providing text notecards for all objects containing text in graphic format
- synchronized streaming captions for videos
- text transcriptions for streaming audio
- conversion of voice to text that is exposed to screen readers
- inclusion of user help functions
- potential to interface with wearable computers
- web browser alternatives to client viewers
- accompanying website must also be accessible.

This review of existing solutions also provided a foundation on which we could begin to design and develop an open source accessible viewer. The solution that was developed through this project and the testing of the accessibility features are reported in the next section.

### 3.1.4 Design of an accessible 3DVLE

The solution developed aimed to incorporate these accessibility features and builds on and complements *MaxVoice* technology developed by Virtual Helping Hands Inc. There are two main components to the system. Firstly, the integration of text to speech and accessible interface controls in the 3DVLE client viewer (Figure 3). The second being a web-based interface enabling a user to participate in synchronous sessions held in the 3DVLE through an accessible web page. Figure 3 illustrates the core functionality of the web-based interface.

As Figure 4 shows, the web-based interface displays slide show presentations from the 3DVLE on the web page (1). The slide show text is streamed into the dynamic text chat area of the web page along with any text chat occurring in the 3DVLE (2). Screen grabs of the 3DVLE are streamed to the web page every ten seconds (3) and any audio playing in the 3DVLE is also streamed to the web page (4). While the system does not support live captioning, an area of the web page is provided to enable teachers to display prepared transcriptions of their verbal presentations (5). The process by which the 3DVLE interfaces with the website is described in the following section and shown in Figure 5.

Users logged into the 3DVLE can type text into the chat window within the 3DVLE interface and they can hear that text read aloud, as well as the text messages from others participating in the chat session. The text chat is sent via http requests to the web server and the data stored in a database. Similarly, any slides being displayed 'in-world' are sent as images and text equivalents to the server.

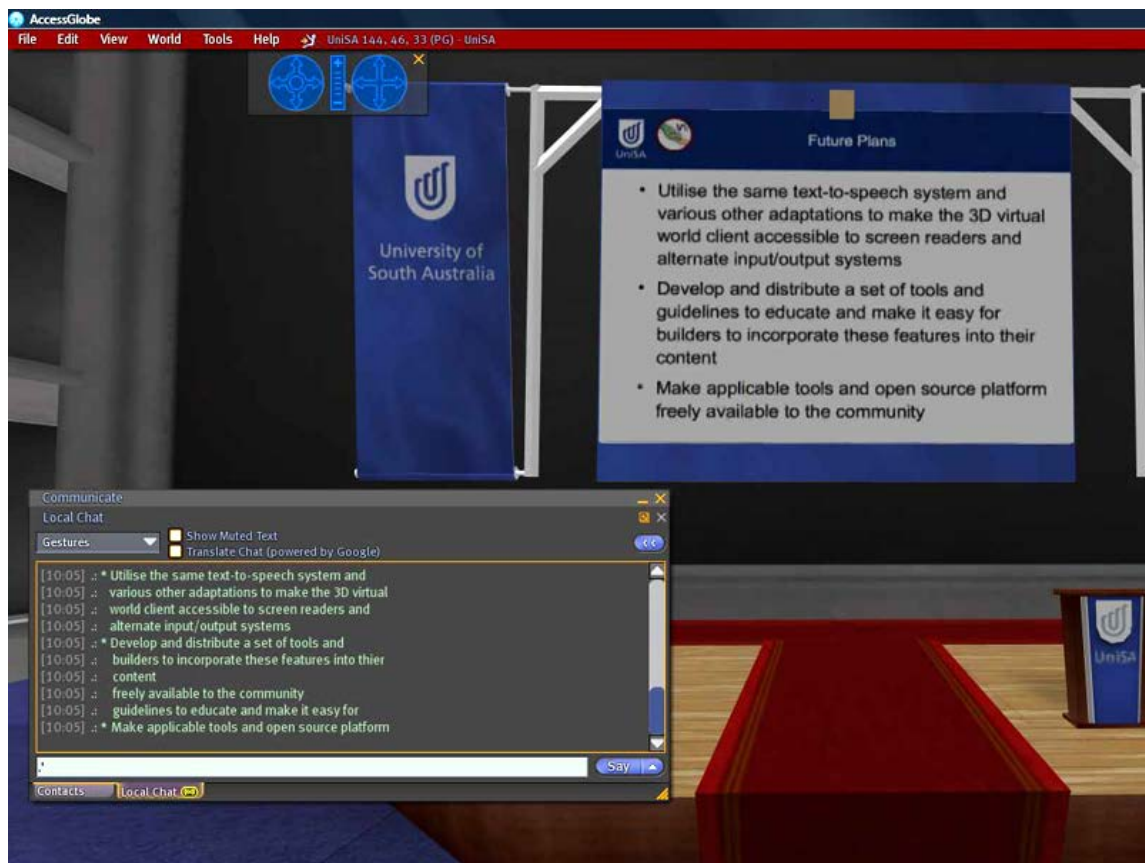
On the web site, users login to the site and are authenticated. Asynchronous JavaScript and XML (AJAX) is used to poll the database and identify any new content that needs to be displayed via either a refresh or append command to the appropriate element within the page. However, as our initial tests with users with disabilities identified, and as Thiessen and Russell (2009) note, it is very difficult for Assistive Technologies (ATs) to understand Document Object Model (DOM) events in AJAX applications. To resolve this issue, the W3C's WAI Accessible Rich Internet





Applications Suite (WAI-ARIA), which provides a framework for adding attributes to identify features for user interaction, has been implemented. As the WAI-ARIA site explains, ARIA makes it possible to map controls, live regions, and events to accessibility application programming interfaces (APIs). Using ARIA live region mark up, it is possible to set the priority with which ATs should treat updates to the live regions.

Preliminary accessibility testing of the web interface was conducted by Media Access Australia in 2010 and further summative testing of the 3DVLE and web interface involving independent expert evaluations and testing by users with disabilities was conducted in July 2011. The evaluation section of this report presents the findings from both the preliminary and summative findings from these independent evaluations.



**Figure 3:** Slide show text presented through text chat that is read aloud to the user



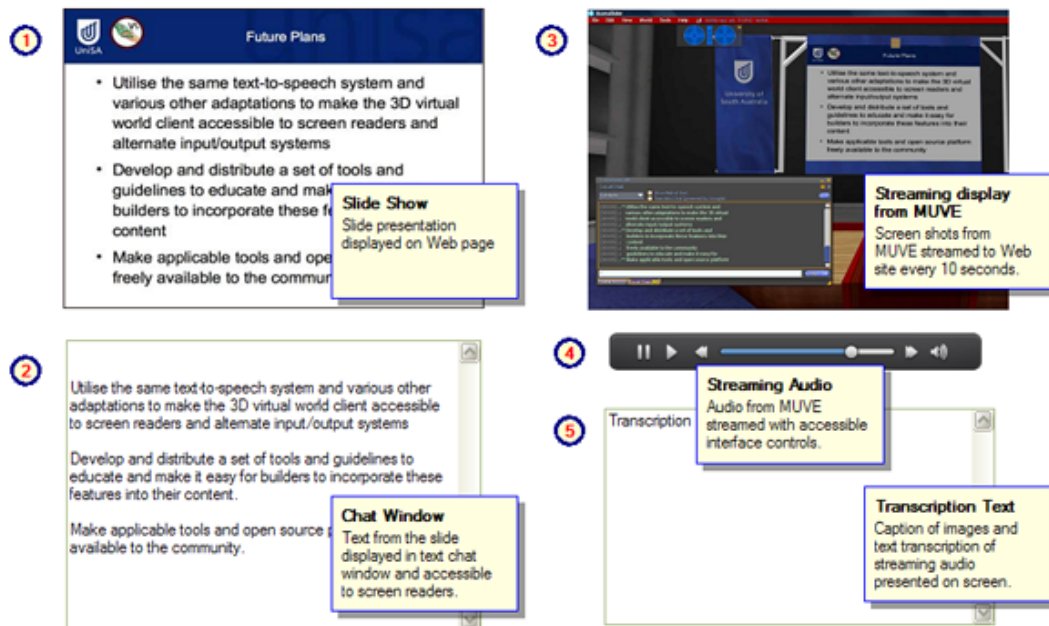


Figure 4: Web-based interface to the 3DVLE

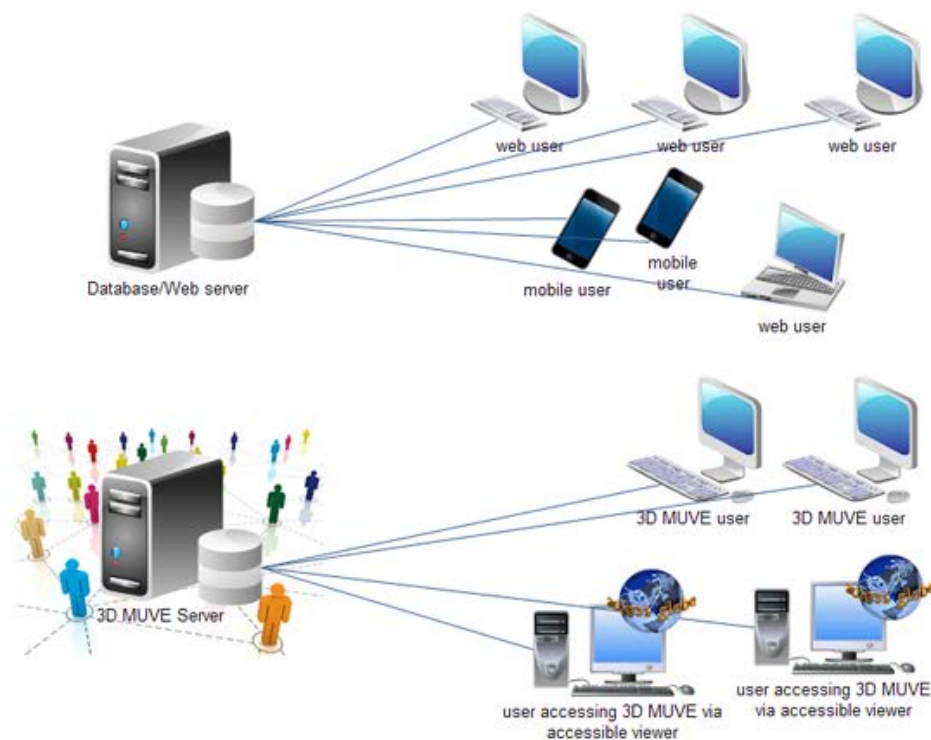


Figure 5: Functionality of the accessible 3DVLE viewer and web interface

## 3.2 Develop guidelines for academics

The methodology employed to develop the guidelines involved ten in-depth case studies undertaken by academics from Australia and the UK across a range of disciplinary fields (see Appendix 2.1-2.10), which included student evaluations of their experiences (for example, see Appendix 3). A survey of academics from Australia and overseas who were actively teaching in 3DVLEs (see Appendix 4) was also undertaken to identify a range of issues that might arise while teaching, learning or researching in 3DVLEs.

Informed by the findings from the case studies and survey of academics, we then developed five hypothetical scenarios (See Appendix 5.1-5.5) relating to research ethics, student probity, student behaviour, access and equity, and Intellectual Property, and used these scenarios to draw out the views of colleagues with expertise in these areas. We provided commentators with an opportunity to edit their contributions and review the way in which we made use of them.

Survey responses and case studies were read and common themes identified. Some guidelines for *Second Life* practice were identified from this process. User testing of the open source 3DVLE was also conducted and feedback from these users about strategies that can be adopted to provide a more accessible 3DVLE for students with disabilities contributed to the development of the guidelines relating to access and equity.

The findings from the analysis of the case studies, survey and user feedback, and the associated guidelines are summarised in the following sections.

### 3.2.1 Case studies

Ten case studies were completed by project team members across a range of disciplinary fields. These include:

- five undergraduate courses offered in the School of Communication, International Studies and Languages at the University of South Australia (Accessible Interactive Media, coordinated by Dr Denise Wood); Design for Interactive Media (coordinated by Mr Frank Kurzel and Dr Denise Wood); Electronic Publishing on the Internet (coordinated by Dr Denise Wood); Electronic Arts: Visual Theatre (coordinated by Dr Russell Fewster); and From Mickey to Manga: Understanding the Animated Image (coordinated by Associate Professor Gerry Bloustien)
- trials of the use of *Second Life* in two library and information science courses (Client Services in Libraries 1 for undergraduate library technician students and Information Resources and Services for postgraduate librarianship students) offered by the Faculty of Computing Health and Science and the School of Computer and Security Science, Edith Cowan University, coordinated by Professor Lelia Green and led by Dr Judy Clayden with Ms Jude Elund as Research Assistant
- Health Science Mammography, Lactation Clinic and Chiropractic Simulations undertaken by project team members at RMIT (Discipline of Nursing and Midwifery, Discipline of Chiropractic and Discipline of Medical Radiations) who worked together to pilot a module on Communication in Healthcare for RMIT undergraduate health sciences students
- the use of *Second Life* to deliver Higher Degrees Research (HDR) Workshops to students enrolled in higher degrees in the School of Education at Monash University



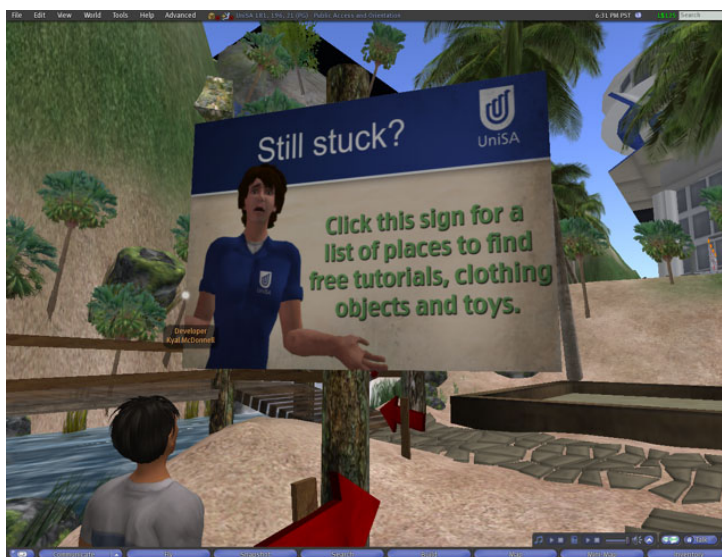
- a module on Research Methods in Education offered within the MA New Literacies program at the University of Sheffield, which introduced students to the concept of virtual ethnography and to enable them to conduct an ethnography of literacy practices in *Second Life*.
- the use of *Second Life* as part of a blended learning approach using an Inquiry Based Learning (IBL) strategy to Information Literacy within the BSc Information Management program at the University of Sheffield.

The significant findings from analysis of these case studies are reported below. The case studies are presented in Appendix 2.1-2.10 and are available for download from the project site.

School of Communication, International Studies and Languages, UniSA courses trialled in *Second Life* between 2008 and 2009.

Several supports were put in place both within *Second Life* and on campus to aid students in the transition to undertaking study in the 3DVLE in each of these courses. These supports included: a) customised login and orientation for students joining *Second Life* for the first time; b) 'in-world' mentoring by former students skilled in the use of 3DVLEs; c) scheduled help sessions on-campus and 'in-world' and d) written tutorial guides on the basics of *Second Life* as well as more specific guidelines relevant to the tasks students were undertaking in the 3DVLE.

A custom PHP script (beta version) supplied by Linden Labs (the company that owns and manages *Second Life*) was installed on a University server enabling students to sign-up to *Second Life* via a University website and to then be teleported directly to the UniSA island orientation area (Figure 6). The orientation section of the UniSA island includes several customised orientation tutorials introducing students to basic skills in *Second Life* such as moving, chatting, using Instant Messages (IM) and customising appearance. Graduate students who were experienced in *Second Life* were contracted to provide individualised mentoring on-campus and 'in-world' at scheduled times.



**Figure 6:** Orientation area on the UniSA SIM in *Second Life*

At the completion of these courses, students were invited to complete an online anonymous survey incorporating questions aimed at identifying students' familiarity with and use of Web 2.0 and 3DVLE technologies, and to assess the extent to which the *Second Life* platform of delivery was perceived by students to support the objectives of the course and enhance their learning. The questionnaire included a mix of Likert-scale (5 point scale ranging from 1 strongly disagree to 5 strongly agree) and open-ended text field questions (see Appendix 3).





Detailed case studies prepared by the coordinators of these six courses are published via the project website. These case studies describe the aims and objectives, the assessment tasks, and the pedagogies employed in each of the courses, as well as the outcomes of student evaluations. The following section provides a brief overview of these courses. The findings reported in this paper focus primarily on the impact that the usability/accessibility of the 3DVLE had on the students' learning experience.

## Accessible Interactive Media

*Accessible Interactive Media (AIM)* introduces students to the principles of usability and accessible web design, understanding the audience, social and ethical implications, legislation relating to accessibility both in Australia and internationally, W3C accessibility guidelines and techniques for accessible web design. The assessment tasks involve analysing a website using the W3C guidelines, developing an accessibility policy for an organisation and designing or re-designing a website that meets accessibility guidelines.

There were 20 students enrolled in the second semester 2009 offering of this online course. Of those students, seven opted to work with *Second Life* groups including the Health Support Coalition, communities of people with HIV/AIDS and ADD/ADHD, a group of leaders of the various support groups and an organisation known as Virtual Helping Hands Inc. They met with their clients on a regular basis in *Second Life* and they also met with the course coordinator on a weekly basis for debriefing sessions.

The primary use of the 3DVLE was as a conduit for communicating with clients and for debriefing. Some students chose to meet their clients via Skype or communicated primarily via email due to the challenges of synchronising meeting times, given the different time zones of their clients. Most students attended the weekly debriefing sessions with the coordinator and periodic sessions conducted by the facilitator of the Health Support Coalition.



**Figure 7:** Students meeting with members of disability groups in *Second Life*

Students were asked to complete an anonymous online questionnaire at the conclusion of the semester (see Appendix 3). This questionnaire included questions aimed at identifying students' familiarity with and use of Web 2.0 and 3D virtual world technologies, and to assess the extent to which *Second Life* was perceived by students to support the objectives of the course and enhance their learning. The questionnaire included a mix of Likert-scale (5 point scale ranging from 1 strongly disagree to 5 strongly agree) and open-ended text field questions.

All seven students (18-34 years) participated in the online evaluation; five were male and two female. All of the respondents were undertaking degrees in the either computer science and/or media arts. Four of the seven respondents reported that they rarely use online 3D computer games; one reported that he/she had never used online 3D computer games and two described themselves as occasional users. No respondents were frequent users of either online 3D virtual games or 3D



virtual worlds such as *Second Life*. All reported that they had access to a high-speed broadband connection at home.

More than half (43 per cent (3) strongly agreed; 14 per cent (1) agreed) of the students stated that they were willing to put the effort needed to complete the learning activities, and most (14 per cent (1) strongly agreed; 43 per cent (3) agreed) that they liked using *Second Life* as part of the course and would recommend the instructor continue using *Second Life*. Five respondents agreed (28 per cent (2) strongly agreed; 43 per cent (3) agreed) that the activities in *Second Life* offered opportunities for interaction and communication.

**Positive experiences reported by students included:**

- the ability to combine their IT abilities with their artistic passion
- learning more about the world of SL [*Second Life*] including reasons for engagement
- provision of very helpful tutorial environment
- provision a safe environment within which to guide students through the complexities and challenges of dealing with 'real clients'
- increase in student confidence in dealing with real life issues
- greater pride and commitment to achieving excellence demonstrated in student work
- development of greater understanding of the difficulties experienced by individuals with disabilities.

**Less positive experiences reported included:**

- lack of understanding for the need for the use of *Second Life* in the course
- difficulty in communication due to time differences.

**Recommendations:**

- more detailed explanation as to reasons for the use of *Second Life* as part of the course
- more regular exposure to use of 3DVLEs as a learning tool as part of the course will increase student familiarity and confidence.

## Design for Interactive Media

There were 90 students enrolled in the *Design for Interactive Media (DIM)* course during the first semester of 2008. The aim of the course is for students to develop games-design skills involving problem solving, creativity, teamwork and communication. The specific aims of the course are for students to:

- understand the basic terminology, concepts and principles of games-design
- convey information effectively and concisely
- create different information structures to control interactions in the interface
- apply the above knowledge and skills in a variety of design situations.



The 90 students enrolled in the course during the first semester worked collaboratively as teams to create an immersive 3D game in *Second Life* using a mix of skills including script writing, storyboarding, interface design and scripting.

Students were free to choose the theme of their adventure games and created the storyboard, script and characters for their chosen game. The basic building components and scripts were provided to reduce the cognitive load on students, thereby enabling students to focus more on the narrative of their games and working collaboratively as teams to bring the games to reality. Student assessment incorporated a grade for the project overall (group score) as well as a percentage assigned to each individual team member based on their contribution to the production.



**Figure 8:** Aerial view of game constructed by a team of students enrolled in *DIM*

Students were given the option of completing the course entirely off-campus or attending practicals and lectures on campus. All lectures on campus were simultaneously conducted in *Second Life* enabling students who were unable to attend classes, the opportunity to still participate in the course. Twelve students chose to attend lectures externally via *Second Life* and of those, four also attended practicals virtually as well.

An anonymous online questionnaire was conducted at the conclusion of the semester for students enrolled in the course. The detailed findings are reported in the case study in 2.3 and summarised together with the evaluation findings from EPI below.

## Electronic Publishing on the Internet

There were 65 students enrolled in Electronic Publishing on the Internet (EPI) in the first semester of 2008. The course provides the foundations for understanding the principles of electronic publishing on the internet and places emphasis on applying the principles and elements of design to the creation of web pages, communication skills, team work, and designing a portfolio for online delivery.

The topics covered combined theoretical information presented through a series of readings and



**Figure 9:** EPI student portfolio in *Second Life*





reflections on theory with the applied skills required to design and develop a portfolio presence in a 3D virtual world. Guest presenters from businesses presented many of the sessions on campus and in *Second Life*. Students were given the option to attend face-to-face sessions on campus or attend classes virtually via *Second Life*.

Students undertook three assignments: (1) a design proposal outlining target audience and design specifications; (2) a prototype of the final website design created in Photoshop and (3) a portfolio shop front in *Second Life*, which linked to their online portfolio. Students undertook peer review of each other's *Second Life* portfolio shop fronts as well as the online portfolios.

An anonymous online questionnaire was conducted at the conclusion of the semester for students enrolled in *DIM* and *EPI* courses, which included questions aimed at identifying students' familiarity and use of Web 2.0 and 3D virtual world technologies, and to assess the extent to which the *Second Life* platform of delivery was perceived by students to support the objectives of the course and enhance their learning. The questionnaire included a mix of Likert-scale and open-ended text field questions. 30 per cent of the students enrolled in the two courses completed the online questionnaire. Only three students agreed to a follow-up interview but did not respond to subsequent emails inviting them to meet with an independent evaluator.

#### **Positive experiences reported by students to DIM and EPI included:**

- increased student cooperation and social interaction in learning (Greater for DIM than EPI due to nature of individualised tasks in EPI)
- greater flexibility for remote learning
- increased ability to think critically using *Second Life* (3.23 and 3.0 respectively)
- greater willingness to complete the learning activities using *Second Life*.

#### **Less positive responses reported by students included:**

- the lack of server stability throughout the project impacted on the ability for students to complete their 'in-world' assignments on time. Sometimes technological problems resulted in the loss of their work when they were unable to save (take copies) of completed objects and scripts back into their inventories
- the complexity of the interface and required learning curve, which several students reported was a hindrance to their learning experience
- the views of at least a few students, that the commercial 3D virtual learning platform was inappropriate
- the cost associated with uploading work generated by students outside the 3D virtual environment. While students were provided with a bank of virtual (Linden) dollars, several felt it inappropriate that they should be expected to pay to upload work to complete their assignments
- our inability to show 'in-world' content that is permissible on campus because we could not guarantee the security of material displayed or hosted on a public server
- the lack of appropriate on-campus facilities and the limitations of the *Second Life* platform, which meant that we were unable to effectively deliver content shown in lecture theatres to our students attending virtual classes on our University island (for example we were unable to share applications running on computers in lecture theatres with students attending externally via *Second Life*).





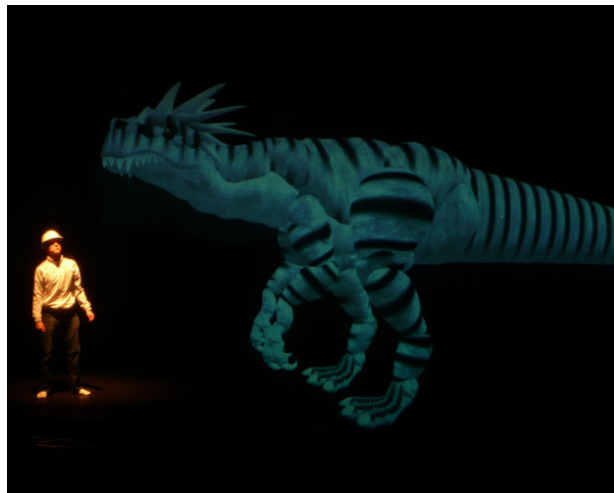
### Recommendations:

- Consider using a dedicated 3DVLE platform installed on a university server to increase stability and security concerns.
- Provide more comprehensive information about use of 3DVLEs in corporate settings with guest lecturers from /external organisations to increase students' perceptions about appropriateness of commercial 3D virtual learning platform.

### Electronic Arts: Visual Theatre

Electronic Arts: Visual Theatre (EAVT) is a second-year course that offers students the opportunity to create performance work that integrates visual technologies. Compositional principles are conveyed through the body and technology and developed via improvisation and teamwork.

Over a four-week period, 21 students (13 male and eight female) who were enrolled in the second semester 2008 offering of the course undertook one component of the assessment (assessment 1b) requiring them to demonstrate their developing understanding and use of the body and the voice, body language, theatrical space and physical performance, and the performer's relationship with an audience in a dual setting of live and virtual performance in *Second Life*. The criteria for assessment were similar for all three practical projects and reflected the focus on exploring the play between live and digital or virtual presence. Further detailed descriptions of the activities undertaken in *Second Life* are available from the case study available for download from the project site.



**Figure 10:** Student interacting with avatar in a performance on stage and in *Second Life*

The 21 students enrolled in the course were invited to complete an anonymous online questionnaire at the conclusion of the semester. This questionnaire included questions aimed at identifying students' familiarity with and use of Web 2.0 and 3D virtual world technologies, and to assess the extent to which the *Second Life* platform of delivery was perceived by students to support the program.

### Positive responses reported by students included:

- greater willingness to complete the learning activities and greater engagement engaged in the learning experience in *Second Life*
- perception that 'The learning experiences were active and collaborative in *Second Life*'
- generation of good interaction both in-program and in real life.

### Less positive responses reported by students included:

- limitations of the chat tools made communication more difficult
- technical limitations of the communication tools in *Second Life*



- need for more time to become acquainted with the environment as well as the technical demands in integrating the virtual with live theatre.

#### Recommendations:

- Use of dedicated 3DVLE platform rather than *Second Life* platform will increase stability, technical aspects and security.
- Greater information about the use of 3DVEs in corporate settings with guest lectures from /external organisations will increase students' perceptions about appropriateness of commercial 3D virtual learning platform
- Provide greater time in the course to allow students to become more familiar and confident with the platform.

### From Mickey to Manga: Understanding the Animated Image

Twenty-eight students were enrolled in *From Mickey to Manga: Understanding the Animated Image (MTM)* in Summer School 2008. The course was conducted online in intensive mode over five days with students attending two sessions per day during that period.

These seminars included 10 screenings (10 x one hour) of classical animated features from film, television and games to illustrate the full range of animation product. Further details are available from the case study presented in Appendix 2.6. Students completed two major assignments. The first assignment was a written essay involving textual analysis and discussion of an animated film. The second assignment was a group assignment in which students could either prepare a character design and synopsis of a short animated film, or produce a machinima piece using either the tools in *Second Life* or another games design application.



**Figure 11:** Students enrolled in *MTM* attending a tutorial session conducted in *Second Life*

#### Positive responses reported by students included:

- a greater sense of presence for students studying externally making it 'much easier to relate to other students and the lecturer'
- having a real time discussion is preferable to communicating only through the discussion boards
- that the course was fun
- the lecturer (teaching remotely interstate and sometimes overseas) reported the experience of teaching workshops and seminars through a 3DVLE was unusual and exhilarating.



### Less positive responses reported by students included:

- difficulty of access to required computer hardware
- need for access to computers that support the required software.

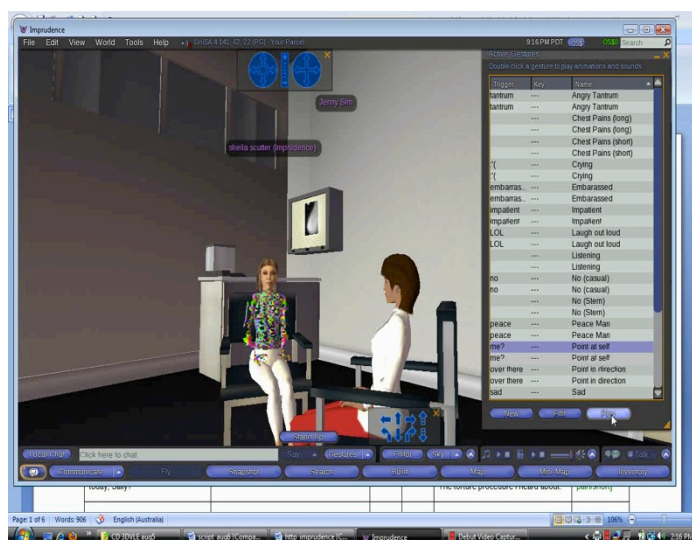
### Recommendations:

- Ensure that the university campus provides continuous access to the required hardware and software if the use of the 3DVLE is required in the course.
- Provide an option for students studying externally to undertake alternative assessment activities if they do not have access to the required equipment or bandwidth at home.

## Health Science Mammography, Lactation Clinic and Chiropractic Simulations, RMIT

This pilot module was conducted in the second semester of 2010. The detailed case study findings are reported in the case study, which can be downloaded from the project website.

The module was offered in three separate components linked together via a single patient journey. Students enrolled in the Discipline of Nursing and Midwifery participated via the online mode while students from both the Discipline of Chiropractic and Medical Radiations were offered a blended mode of learning. All students arrived at the Island Polyclinic on *ReactionGrid*, which houses a range of health services including pharmacy, midwifery consulting rooms, chiropractic clinics, and diagnostic imaging.



**Figure 12:** A radiographer and a patient during history-taking in the mammography clinic

For each program, students began observing a role play in their respective discipline and reflected on the interactions and communication between the healthcare practitioner and patient. They then conducted the role play, with one assuming the role of the health practitioner and another, the patient and vice versa (Figure 12). The sessions were recorded and students were able to do as many practice sessions as they wished before submitting the role play for lecturer and peer feedback. Students completed a reflective assignment, first reflecting on their own role play and then reflecting on the role plays of their peers. The final activity involved participating in the module evaluation.

The overarching aim of the pilot module was to provide students with opportunities to develop the basic communication skills that are essential for healthcare practitioners. These include, but are not limited to:

- effective listening such as active/passive listening and questioning skills
- nonverbal communication skills
- verbal communication skills

- history taking skills
- problem solving skills
- strategies in assisting patients to cope with anxiety
- working as a healthcare team in an interdisciplinary manner.

Of the 16 students who elected to undertake the simulation assessment, eight responded to the online survey. Six of the students were enrolled in the medical radiation program and two in the Graduate Diploma in Professional Lactation Consultancy. Most of the respondents (five) were in the age group 19-24, with two students being 25-34 and one over 55. All respondents were female.

#### **Positive responses reported from students included:**

- greater feeling of real time and immersive experience than using discussion board or plain text chat
- greater sense of fun, and creativity
- easier to learn and retain information
- simulated mammography experience provided an opportunity to gain a deeper understanding of the possible responses and experiences of patients.

#### **Less positive responses reported from students included:**

- less interaction between other students
- difficulty of using interface to complete work
- excessive time required to understand the platform which detracted from the learning experience.

#### **Recommendations:**

- Provide comprehensive instructions to assist students who are unfamiliar with the learning environment to gain the prerequisite skills to complete learning activities.
- Provide adequate time in the course to allow students to become more familiar and confident with the platform.

### **Higher Degrees Research (HDR) Workshops, Monash University**

The aim of the case study was to explore the implications for students and lecturers of using a 3DVLE in delivering HDR student workshops. Further details are available from the case study, which can be accessed via the project website.

No prerequisite skills in using 3DVLEs were assumed for either the students or lecturers. As a consequence, a “How to” guide was created and both the students and lecturers participated in the workshop series included pre-workshop



**Figure 13:** Monash University HDR students meet to attend workshops in *Second Life*





activities, including an orientation session in *Second Life* to practise a variety of in-world skills that would be required for the in-world learning activities such as moving, communicating, using text and voice, change appearance and to customise their virtual environment. In addition, the students were supported during the HDR workshops by roving technical support staff. Participants accessed *Second Life* from a computer lab, office or home.

The learning activities aimed to provide the students with an opportunity to:

- strengthen their collegial networks by engaging with each other synchronously in the workshops
- develop knowledge and skills relating to HDR studies, specifically, designing ethical research and preparing for publications.

Due to the voluntary nature of the workshops and the assessment requirements of HDR courses (i.e. by thesis), there was no formal assessment during the workshops. There were three phases of learning activities: a workshop in *Second Life*, an online collaborative activity and the second workshop in *Second Life*.

HDR students from the Faculty of Education were invited to attend one of two workshops which were to be conducted simultaneously in *Second Life*: 'How to write an excellent abstract' and 'Applying for ethics approval from the Ethics Committee'. The students chose one workshop according to their interests and research needs. Four weeks after the first workshop a follow-up workshop for each topic was conducted simultaneously in *Second Life*. In the time between the workshops the students participated in a small online collaborative project which built on the learning activity in the first workshop, and supported the learning activities in the second workshop.

Sixteen students attended the first set of workshops and nine students attended the second set. After each workshop the students were invited to complete an online survey. The first survey included questions aimed at identifying the demographic characteristics of the participants, their familiarity with 3DVLEs, as well as their perspectives on *Second Life* and other supporting technologies as a platform for the learning activities of HDR students. The second survey aimed to investigate if and how the participants' perspectives on virtual learning experiences had changed. The questionnaires included a mix of Likert-scale items (five point scale ranging from strongly agree to strongly disagree) and open-ended questions.

Only seven students completed both surveys and only data from these seven students were used for quantitative analysis. Overall, the students' ratings of the effectiveness of learning activities experienced over the two workshops were higher than their ratings of social interaction.

**Positive responses reported by students included:**

- learning activities in *Second Life* were engaging and provided opportunities for an enriching, exciting and unusual learning experience
- greater convenience, increased focus and concentration, and the ability to multi-task in a way which supports their learning
- use of other technologies such as links to videos and online forums were important for the collaborative peer-assisting activities between the seminars.

**Less positive responses reported by students included:**

- some students still prefer face-to-face seminars



- server instability affected the quality of the learning and interaction during the seminars
- access to technology could be problematic.

### Recommendations:

- Use of university hosted 3DVLE can increase stability, and improve technical aspects and security.
- Provide sufficient time in the course to allow students to become more familiar and confident with the platform.
- Offer the course in mixed mode (both as 3DVLE and in the face to face classroom) mode to accommodate diverse learning needs, including those of students who cannot attend face to face classes and consequently may suffer social and intellectual isolation.
- Verbal interaction among the participants, which is vital in workshop/seminar-like activities, is more active and successful when the number of participants is limited. Like many other learning contexts, active student engagement can be achieved by designing for groups activities.

### Research Methods in Education, University of Sheffield

The MA New Literacies is an online course. The course considers how new technologies are affecting the way literacy and language conventions are changing and the ways in which we are using literacy and language differently in a digital age. This work formed one unit in a module on *Research Methods in Education*. There were ten students in the year group and this unit was one of three options. Five students

wanted to undertake the unit but two were not able to due to technical difficulties with their home computers. Three students undertook the unit of work. The aims of the unit were to introduce students to the concept of virtual ethnography and to enable them to conduct an ethnography of literacy practices in *Second Life*.

The objectives were to:

- develop students' understanding of the nature of ethnography in virtual worlds
- enable students to undertake an ethnographic study of literacy in an area of *Second Life* (ie a specific location, or with a group of specific participants)
- familiarise students with literacy practices undertaken in *Second Life* and enable them to reflect on these in the light of previous work on the nature of literacy in a digital age.

As this was an optional unit within a larger module, the work was not formally assessed. Students presented their findings in *Second Life*, which included the



**Figure 14:** *Research Methods in Education* students at the University of Sheffield presenting their work in *Second Life*



production of a PowerPoint presentation and discussion of the content of the presentation in an online seminar. Students also had the option to complete a 6000 word essay on the nature of virtual ethnography. Two of the three students who took this unit of work completed this assignment.

None of the students had used *Second Life* prior to the unit of work. We therefore undertook a virtual induction process where we supported students through a series of activities, which aimed to familiarise the students with the virtual environment. These induction notes had been piloted previously with work with 18 members of staff in the School of Education and adjusted accordingly. As the induction did not take place in a face-to-face environment, we ensured that the instructions could be used by students independently. The tutors on the unit were joined by a third member of university staff, Sheila Webber, in the induction sessions and so the students felt that they had sufficient 'in-world' support. Once induction was completed, three seminars were conducted in *Second Life* (see appendix 2.10 for details).

Students then undertook individual ethnographic studies of literacy in an area of *Second Life*, each spending approximately 50 hours on average in *Second Life* undertaking the studies. No formal sessions were organised in *Second Life*.

Over a series of seminars in *Second Life*, students then presented their work to each other and the tutors, summarising their findings using a PowerPoint slideshow.

**Positive responses reported by students included that:**

- Learning activities in *Second Life* were fun and enjoyable.
- *Second Life* involves a great many different types of literacy and that participants have to be technically literate to participate.

**Less positive responses reported by students included:**

- awareness that *Second Life* raises new ethical issues, such as authenticity and the students felt unequipped or unprepared to deal with this.

**Recommendations:**

- In future developments of this unit of work, the period of study will be extended so that students have more opportunities to consider ontological issues before undertaking their ethnographic studies.
- Students will also be given the opportunity to conduct pilot studies before undertaking their ethnographic studies.
- Finally, the coordinators will focus the presentations on the students' experience of conducting virtual ethnography.

**Information Literacy, BSc  
Information Management  
program, University of Sheffield**

This class aimed to develop students' inquiry skills so that they could engage with mini research projects carried out the following semester, with the ultimate goal of conducting individual research projects in their



**Figure 15:** Information Literacy students conducting interviews in *Second Life*



final year. The Information Literacy class also contributed to the progression of other key skills e.g. group work skills. The course aims to progress students' information literacy in key areas, and develop their understanding of information literacy theories and practice. By the end of the module students will have learnt to:

- analyse their own information behaviour and start to identify ways in which they can become more information-literate
- understand some key information literacy models and theories
- plan a strategy for seeking information and search for information in specific information sources
- apply an evaluation framework to information resources
- interact with others to explore their information behaviour and needs
- communicate more effectively orally and in writing.

The use of *Second Life* was trialled as a strategy for engaging students more meaningfully with the models of information behaviour theory through an Inquiry Based Learning (IBL) approach undertaken in a blended learning environment. *Second Life* provided an environment in which data gathering could take place, providing students with unique data, to which they could apply their understanding of the models. Thus, the aims of the action research were to facilitate deeper engagement with the subject matter, and to identify whether a 3DVLE itself is a viable environment for IBL.

There were two assessment tasks:

**Assignment 1:** Results of a research interview carried out in *Second Life*.

An individual assignment in which the student reports on a research interview carried out in *Second Life*, and analyses both the transcript of the interview he/she undertook and a second interview transcript from a previous year. The analysis includes comparing the findings with models of information behaviour from the research literature. The student also reflects on their performance as an interviewer.

**Assignment 2:** Structured reflective report on development of information literacy.

The aims of this assignment were for students to demonstrate understanding of information literacy, information and information behaviour and to reflect on progress as an information-literate person. The student provides a report structured around the SCONUL Seven Pillars of Information Literacy (SCONUL, 1999) in which he/she discusses achievements, and ways in which he/she hopes to make improvement. This report is backed up by evidence presented in the e-portfolio.

Feedback from students was obtained through 'in-world' chat with students and co-tutors (captured in chat transcripts), tutor observation of class activity, examination of student coursework, and tutor reflection (via personal journaling, interview and discussion with co-tutors acting as 'critical friends'). The student assignments were seen as the most valuable evidence in terms of ability to analyse transcripts, and apply understanding of information behaviour research models. Students' use of their own original data enabled them to demonstrate their understanding more clearly than had been the case previously.

**Positive responses reported by students included:**

- *Second Life* provided a pool of interviewees outside the university, and enabled the opportunity to investigate a novel area (i.e. information behaviour in *Second Life*), adding to the authenticity of the experience.





- The use of *Second Life* added an extra perspective to the reflection which the students had to make on their skills as interviewers as students were able to identify issues specific to the 3DVLE context.

#### **Less positive responses reported by students included:**

- Technical problems proved frustrating with frequent problems of crashing and lag. Problems were exacerbated by the challenges faced when interviewing people in different time zones.
- Access was a challenge. The university was not willing to install the *Second Life* viewer on the university's computer desktops, which meant that it was not available in the main university computer labs. Thus, access was a challenge for some students.

#### **Recommendations:**

- 3DVLEs should be used as part of a blended learning approach.
- As the effort of learning to 'be' in *Second Life* is worthwhile, it is necessary to ensure that students understand why they are using a 3DVLE, and using a problem and inquiry-based approach to teaching.

#### **Client Services in Libraries 1 and Information Resources and Services for postgraduate librarianship students, Edith Cowan University**

Two courses were trialled in *Second Life*: IST2161 Client Services in Libraries 1 (undergraduate library technician students) and IST4104 Information Resources and Services (postgraduate librarianship students), both offered by Dr Judy Calyden in the Faculty of Computing Health and Science, School of Computer and Security Science. No pre-requisite skills in 3DVLEs were assumed, though some students had already completed a unit in *Second Life* in a previous course.

The overarching project, of which this case study was only a part, aims to enhance learning and teaching through innovative new technologies and curriculum development, and foster excellent teaching in education. The project aims to facilitate the development and support of reciprocal collaborations that address emerging issues in the application of new technologies in learning and teaching.

The aims of the trials of *Second Life* in the courses were to:

- determine the usefulness of the platform to Library and Information Science
- explore students' perceptions of presence and immersion in the 3DVLE
- investigate the potential of the 3DVLE to allow reflection and evaluation relating to 'real-world' interactions.



**Figure 16:** Library and Information students at Edith Cowan University students conducting reference interviews in *Second Life*



The activities in *Second Life* involved conducting reference interviews 'in-world' and responding to the information requirements of other students, and to reflect upon the process of using a 3DVLE to facilitate their experiences. These activities were not a formal assessment item in either unit, but rather substituted for half of the second assignment in both units. Students were also asked to volunteer to participate in a subsequent focus group. As an inducement, all students who participated were offered full marks for half of their second assignment.

Distance education students were invited to join the exercise but only one was able to participate. Daylight saving time differences between the eastern states and Perth added a layer of difficulty to attempts to recruit participants. As a result, students who were not able or willing to contribute to the experiment were offered a substitute exercise, submission of which meant they also gained full marks.

The investigation took place over three weeks. During the first week's on-campus class, students were given a detailed explanation of the process, invited to participate and given the opportunity to ask questions about the project. Some indicated that it would be helpful if avatars were available for them to 'adopt'. Several avatars were created before the reference interview exercise session and located at different places on UniSA island in *Second Life*.

All of the on campus students present in the second week decided to participate and gathered in a laboratory where *Second Life* was available.

Students were asked to complete an anonymous online questionnaire at the conclusion of the *Second Life* session. This questionnaire included questions designed to assess the extent to which the *Second Life* platform of delivery was perceived by library and information science students be a useful site for developing skills related to the reference interview. It was short, comprising Likert-scale (five point scale ranging from one not at all useful to five extremely useful) questions. Students were also able to comment if they wished.

#### **Positive responses reported by students included:**

- *Second Life* offers a potential site of useful interaction at a distance. Students were able to understand the difficulties routinely faced by their distant colleagues.
- Some students reported that participation in the *Second Life* activities gave them the ability to ask questions more easily.
- For some students, the ability to rephrase the question and not to have to deal face-to-face with the student reference librarian was seen as an advantage, especially for those asking the questions.
- Generally accepted stereotypes about the age and gender of librarians could also be challenged through *Second Life*.

#### **Less positive responses reported by students included:**

- Students experienced server lag which detracted from the learning experience.
- Some believed that the *Second Life* experience required them to write more formally, even in Instant Messages (IM), missing the cues normally found in face-to-face interactions.
- Some students expressed concerns about the lack of security in *Second Life*.



### Recommendations:

- 3DVLEs should be used as part of a blended learning approach.
- Students need to understand why they are using a 3DVLE, particularly in a professional setting.

### 3.2.2 Summary of case study findings

Students and teachers who participated in the trials of the courses reported in these case studies noted the potential benefits of undertaking learning activities in *Second Life*. These include a greater sense of engagement, flexibility, creativity, commitment and fun, an increased desire to excel and to collaborate. In many cases, the students felt a greater sense of authenticity because they knew they were interacting with individuals outside of the classroom setting.

There was a general perception that *Second Life* could provide a safe environment within which to guide students through the complexities and challenges of dealing with real clients and therefore the students could gain more familiarity and confidence in dealing with real life issues. Case studies drawn from professional areas such as health, librarianship or education, often with a mature-aged cohort of students, particularly highlighted the positive effect of using 3DVLEs because this context helped them overcome or increased awareness of the problems of remote education. In some cases, such as librarianship, students noted that working with avatars helped to challenge the usual gender and age stereotypes that often undermine their profession. While none of the students identified as having a disability, the usability and accessibility challenges experienced by many of the students undertaking learning activities in *Second Life* highlight both the learning curve in mastering the interface and the design issues that need to be addressed if such environments are to be accessible to learners with physical, sensory, and/or cognitive impairments. These observations reinforce the concerns identified from the review of the literature and our ethnographic research about the accessibility challenges posed by such media-rich learning environments.

Despite these stated benefits expressed by students, there were also negative comments reported by students in their evaluation of the usability and accessibility of *Second Life*. The main issues reported by students were the lack of stability of the server, difficulties connecting to the server, bandwidth limitations, lack of access to computers that could handle the graphic demands and the usability of the interface. Several students were critical of the interface and functionality to support this kind of learning while others noted the challenges in scheduling sessions across different time zones. Some restrictions and forms of censorship imposed by the parent institution due to perceived ethical or privacy concerns also led to difficulties of access for some students.

Recommendations by the coordinators of the programs in our case studies fell into three main areas: technological, pedagogical and ontological. Many coordinators suggested that the use of dedicated Sim, rather than use of the public *Second Life* platform would increase stability and improve issues of privacy and security. It was also felt that greater time should be built into the programs when 3DVLEs are used to allow students to become more familiar and confident with the platform. Secondly, it was recognised that different students benefited from varying learning styles and so pedagogical flexibility was still essential in programs. Therefore, teachers felt that the courses should be offered in mixed mode (both as 3DVLE and in face to face classroom mode) to allow for variety of learning needs. Finally, coordinators expressed the need to allow more time when using 3DVLEs to enable students to explore the philosophical and ontological ramifications of using such a complex, interactive learning tool.



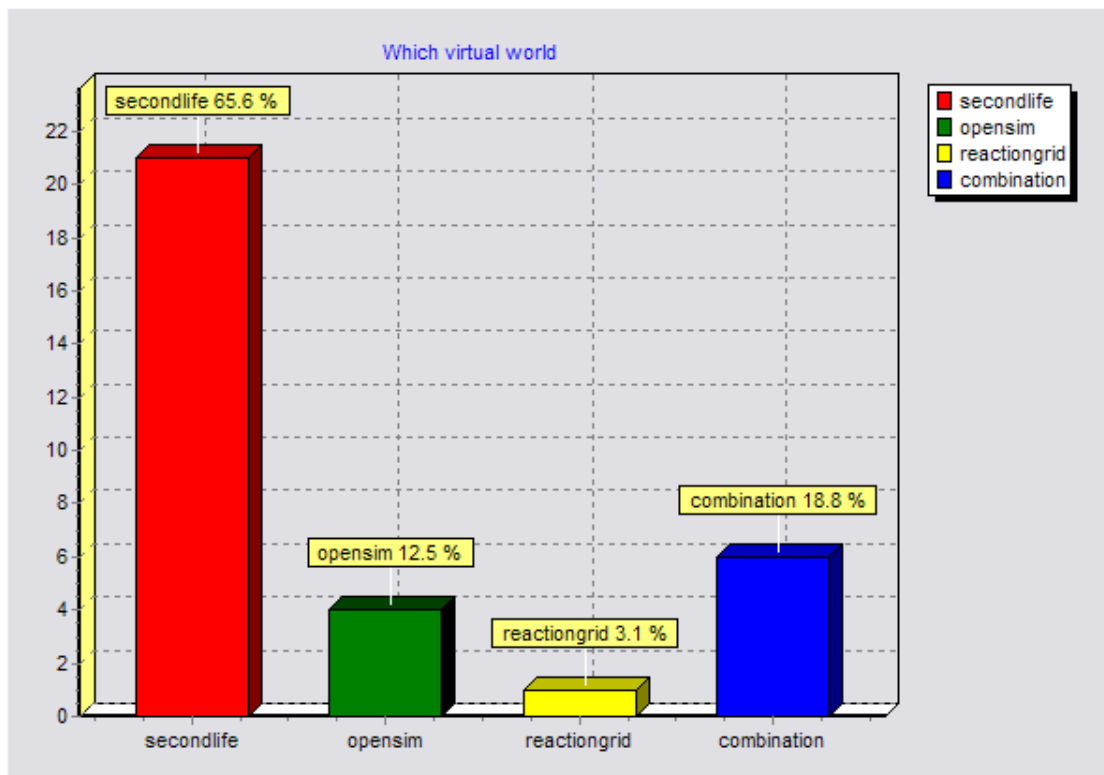
### 3.2.3 Email survey

Academics who are teaching in 3DVLEs were recruited via an email invitation distributed by the moderator of the Listserv for the Australian Virtual Worlds Working Group, the *Second Life* Listserv, and via a 'snow ball' sampling technique.

Thirty-two academics responded to the invitation and agreed to complete a survey distributed via email comprising a mix of check-box and open-ended text responses designed to elicit information about their experiences teaching in 3DVLEs. The aim of the survey was to shed further light on issues concerning ethics, probity, student behaviour and equity in the use of virtual worlds in learning and teaching at a university level. Of those respondents, 21 (65.6 per cent) reported that they were teaching in *Second Life*, five (15.6 per cent) using *OpenSim/ReactionGrid* and six (18.8 per cent) using a combination of 3DVLE platforms (Table 1 and Figure 17).

**Table 1:** Which virtual world is used by academics surveyed?

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid <i>Second Life</i>	21	65.6	65.6	65.6
<i>OpenSim</i>	4	12.5	12.5	78.1
<i>Reaction Grid</i>	1	3.1	3.1	81.3
Combination	6	18.8	18.8	100.0
Total	32	100.0	100.0	



**Figure 17:** Use of 3D virtual worlds by academics surveyed

Respondents represented a diverse range of disciplines including humanities, business, computing and IT, education, health sciences, social work, journalism, information studies, surveying, geography, engineering and legal studies.



Academics reported a variety of reasons for conducting classes in a 3DVLE, including:

- providing students with a more international and intercultural experience
- providing students with a more engaging and immersive learning environment
- providing a laboratory for language learning
- health science role plays
- business simulations
- enhancing social interactions and collaboration
- providing a constructivist learning environment that enables students to build and experiment
- conducting research
- providing students with the opportunity to undertake field trips and accommodating distance education students.

More than half of the respondents (62.5 per cent) reported that the activities undertaken by students in the 3DVLE were assessed. Similarly, more than half (65.6 per cent) indicated that students in their classes reveal their identity. The majority of respondents reported that this requirement had not created any issues with students, though one academic pointed out that revealing identity can detract from the learning experience in role play simulations. Revealing identity was seen to be important when assessing student work, although some academics reported maintaining a master list of student names and their avatar counterparts to overcome this issue.

Probity did not emerge as a major issue for most respondents because they have adopted strategies to counter such behaviour. For example, several academics noted that their presence in the virtual world during classes and their interactions with students helped to counter the risk of 'cheating'. Others reported that they ensure that student assignments are individualised and thus less likely to encourage copying others' assignments. Academics who stated that they conduct the classes in a laboratory on campus reported fewer problems in this regard than teachers conducting distance classes. Several academics stated that they trust their students and one stated that he/she requires students to sign the same assignment declaration form as they would for any other assignment undertaken in the physical world. One respondent indicated that while this is not an issue at present because the virtual classes are conducted in blended mode, it might be a more significant concern if the entire curriculum is offered online.

Fourteen respondents (43.8 per cent) reported that they have had to deal with student behaviour issues in the 3DVLE. The issues identified include 'spamming and gratuitous rezzing of objects', sharing inappropriate photos, disrupting classes, harassing other students, inappropriate appearance (including avatars removing all clothing) and using virtual weapons. Most of these respondents were comfortable with the strategies employed to deal with disruptive behaviour. For example, several noted that it is not much different than dealing with behaviour problems in the classroom (though one noted he/she would respond differently if a student was running around the physical campus with a machine gun!). As one respondent commented:

We consider the student's behavior [sic] and appearance on the meta-campus to be the same as that on the tangible campus. If a student is not allowed to





dress inappropriately, carry a weapon and disrupt classes in RL [real life] why should they be allowed to dress inappropriately, carry a weapon and disrupt classes in SL [*Second Life*].

The most typically reported response to such disruptions is to speak to the student concerned privately (either 'in-world' or in the physical classroom) and to issue warnings for repeat offences. Most academics stated that they impose penalties if the behaviour continues, such as banning them from the Sim for a day. Several academics noted that the novelty effect of behaviour, such as inappropriate dress, soon wears off in any case.

Respondents reported a variety of approaches to preparing students for the virtual world, with the majority offering structured orientation activities and 'in-world' supports. A few academics stated that they prefer to let the students discover the virtual world for themselves. Regardless of the approach to orientation, most academics reported that they provide students with information about expected standards of behaviour either via notecards passed out 'in-world' or links to university policies relating to IT and/or student behaviour.

The majority of participants were overwhelmingly positive about their student experiences in 3DVLE class activities. The reported benefits include: the ease with which simulations can be conducted for geographically dispersed students, the ability to personalise the learning experience and provide individualised feedback 'in-world', the enhanced social connections and student engagement, particularly for students studying off-campus, and the safe environment enabling students to conduct experiments and learn skills without fear of failure or danger.

On the other hand, some academics noted that disruptions can occur 'in-world', particularly in a public environment such as *Second Life*. Other issues reported reflect those noted from the case studies, including: server instability, lack of access to facilities on campus (including issues relating to IT firewall policies), difficulties in scheduling sessions across different time zones, the learning curve for academics and teachers, and diversity in student acceptance of the platform.

Most respondents did not regard equity to be of major concern, but these respondents expected their students to access computer pools if they did not have access to the required equipment or bandwidth at home. This of course is not an option for students studying in distance mode. One academic noted that until these kinds of issues are resolved 'we won't be able to get a greater acceptance of the use of VWs [virtual worlds]. It becomes a reason not to do it by staff and students'. Another commented that equity in teaching in 3DVLEs 'cannot be guaranteed at this point in time for anyone'.

### **3DVLE user comments**

Current users of 3DVLEs were recruited as paid consultants through a notecard distributed by Virtual Helping Hands Inc, a not-for-profit organisation in *Second Life*. Participants in the ethnographic study, who had indicated interest in both contributing to the evaluation of 3DVLEs, and the development of guidelines for improving student accessibility in 3DVLEs, were also recruited.

Fifteen individuals responded to the notecard invitation including 13 who have disabilities (both visual and mobility impairments, including one who is blind) and three who are experts in 3DVLE development, but did not identify as having a disability in their actual lives. Of those who responded to the invitation indicating interest in being contracted to undertake the reviews, 11 signed contracts and completed their reviews including eight with disabilities and three expert developers.



Table 2 shows that four respondents are visually impaired (including one blind user), four have mobility impairments and the remaining three are expert developers who did not identify as having a disability.

**Table 2:** Disabilities reported by users who conducted testing of the *AccessGlobe* and the Web 2.0 interface

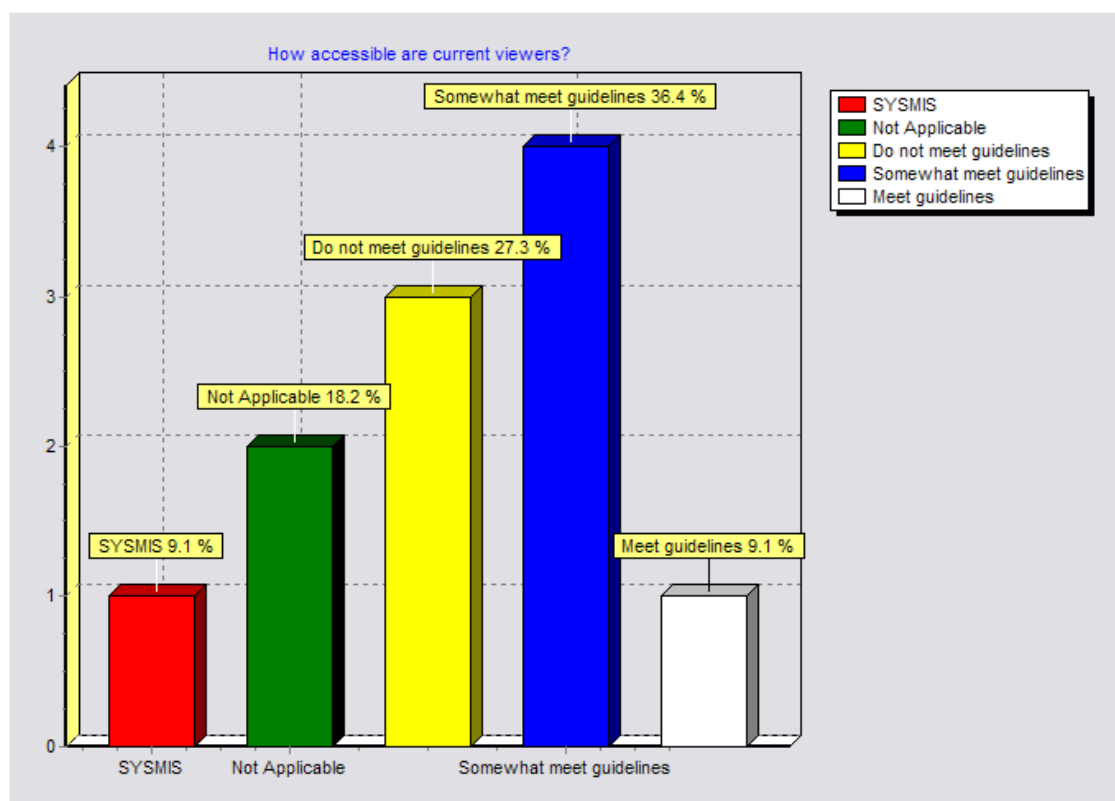
	Frequency	Percentage	Valid Percentage	Cumulative Percentage
1 none	3	27.3	27.3	27.3
2 blind	1	9.1	9.1	36.4
3 visual disability	3	27.3	27.3	63.6
4 mobility	4	36.4	36.4	100.0
Total	11	100.0	100.0	

The majority of users (54.5 per cent) reported that they had at least five or more years' experience in virtual worlds, with only one user (an individual with mobility impairment) reporting that they are a 'novice' user. Half of the participants identified as *Second Life* users, with the remaining reporting that they use multiple platforms. As Table 3 and Figure 18 show, three (27.3 per cent) of the users stated that they do not consider current 3DVLE viewers to meet accessibility guidelines, four (36.4 per cent) stated that these viewers somewhat meet the guidelines and one (9.1 per cent) stated that they do meet guidelines. Two users do not use regular 3DVLE viewers and rely on a combination of the viewer developed for this project (*AccessGlobe* and *MaxVoice* technology, developed by Virtual Helping Hands) due to the nature of their visual disabilities (both are legally blind).

**Table 3:** How accessible are current viewers?

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
0 Not Applicable	2	18.2	20.0	20.0
1 Do not meet guidelines	3	27.3	30.0	50.0
2 Somewhat meet guidelines	4	36.4	40.0	90.0
3 Meet guidelines	1	9.1	10.0	100.0
Total	10	90.9	100.0	





**Figure 18:** User evaluation of the accessibility of standard 3DVLE viewers

The outcomes of user testing of *AccessGlobe* and the Web 2.0 environment created for the project are reported in the evaluation section of this report. This section reports the findings from analysis of users' comments on the importance of a range of strategies that might be employed by teachers/facilitators conducting sessions in 3DVLES. These strategies include:

- providing notecard descriptions to students/attendees
- conducting sessions in both text chat and voice
- providing a live captioner during sessions
- providing text transcriptions for voice and audio
- using YouTube captions on videos displayed 'in-world'
- ensuring that the virtual space provided for classes is designed to reflect accessible physical space in the physical world (eg providing virtual ramps, spaces in virtual rooms for virtual wheelchairs, ensuring virtual doorways are wide enough etc.).

The responses to each of these strategies are summarised below. The detailed findings are available from Appendix 8:

- Providing notecard descriptions to participants: essential – 27.3 per cent, very important – 72.7 per cent.
- Conducting sessions in text chat and voice: very useful – 3.6 per cent, useful – 18.2 per cent, somewhat useful – 18.2 per cent.
- Providing a live captioner during sessions: essential – 36.4 per cent, very important – 18.2 per cent, important – 27.3 per cent, not very important – 18.2 per cent.
- Providing text transcriptions for voice and audio: essential – 4.5 per cent, very important – 45.5 per cent.





- Providing access to *YouTube* captions on videos displayed 'in world': most improved – 36.4 per cent, very improved – 45.5 per cent, improved – 18.2 per cent.
- Ensuring that the virtual space appears accessible: essential – 27.3 per cent, neutral – 27.3 per cent, important – 27.3 per cent, not very important – 18.2 per cent.

As the responses indicate, all users regarded notecard descriptions, conducting sessions in text chat and voice, and providing transcriptions for voice and audio to be essential, useful, very important or important. They were less consistent in their views on the importance of providing a live captioner during sessions, providing *YouTube* captions on videos displayed in world and ensuring the virtual space reflects the appearance of accessible spaces in the physical world.

The mixed response to the question of providing a live captioner at sessions may be a reflection of the range of users given there were no users who identified as being deaf who responded to the invitation to participate. Nevertheless, it is important to note that all users regarded the provision of transcriptions to be essential or very important. The issue of providing *YouTube* captions might have had diverse responses because users did not see the value of showing *YouTube* videos 'in-world'. The diversity of opinion regarding the need for the virtual world to reflect accessible physical spaces is not surprising as some users consider the virtual world should not reflect the real world, while others regard the accessible virtual builds as essential because they provide a model for others to better understand the real world accessibility needs of people with disabilities.

Other strategies proposed by the participants to improve the accessibility of sessions conducted 'in-world' include:

- making better use of soundscapes for blind users
- providing notes for voice in sync with presentations
- providing an option for users to register for events and indicate their accessibility needs in advance
- ensuring support (for example mentors) is available during sessions
- allowing time for all learners to keep up with the pace of the session
- minimising distractions in the virtual space
- providing live descriptions of visual content displayed 'in-world'
- providing an Internet Relay Channel (IRC) so that users who cannot participate 'in-world' can participate via IRC.

### 3.2.4 Expert responses to hypothetical scenarios

To further explore strategies that academics might employ to address issues identified in our case studies, we also invited national and international experts to comment on five hypothetical scenarios relating to research ethics, probity, student behaviour, access and equity, and Intellectual Property issues. These were constructed on the basis of our literature review and the findings from the case studies and survey of academics. We provided commentators with an opportunity to edit their contributions and review the way in which we made use of them. In this paper, we explore their reflections in relation to student probity. These hypothetical scenarios are provided in Appendix 6.1-6.6.

The findings from each of these stages of the research and the implications for the development of guidelines for teachers conducting classes in 3DVLEs are reported in the following sections.



## Managing activities in 3DVLEs

The virtual world allows students at a distance to participate in discussions, seminars and classes. Although the advantages of the virtual world have been anticipated to provide the most benefits for students in remote locations, the case study at Edith Cowan University (Case Study 2.2) demonstrated that on-campus students found the experience more beneficial than remote students, mainly due to the daylight saving-induced differences in time zones.

Similar challenges were experienced by students enrolled in the Information Literacy course at the University of Sheffield (Case Study 2.9), and scheduling issues were also raised by several respondents to the survey.

*Guideline 1: Consider the timing of meetings in the virtual world so that students in different time zones have an equal opportunity to participate.*

A wide range of topics were covered across many disciplines. The use of the virtual world in the business environment was extensive, with students practicing skills in marketing, management plans, change management, customer surveys and feedback.

Tourism and language skills were other frequent examples, with students able to practice language in a real setting, and undertake tasks such as ordering meals in a restaurant or locating and booking accommodation. For students of tourism, the ability to experience destinations provided unique opportunities to gain an insight into different cultures. The use of the virtual world in teaching health science skills was extensive; however, there was a focus more on the communication aspects of health science such as history taking, breaking bad news, clinical decision making and problem solving than on clinical interventions. Some students reported use of clinical investigations on simulated patients, to good effect.

Other examples included landscape design using actual geographic terrain data, and a view of the ways in which visualisation will be possible in the future. The use of art studios for generating and discussing artwork and virtual laboratories where students can learn about health and safety were also described as being valuable. Interestingly, the use of the virtual world for staff professional development was quite extensive, using role plays for providing practice in difficult feedback situations and in conflict resolution. One respondent indicated the use of the virtual world for practicing teaching skills.

Most activities required students to learn to open an account, develop and control their avatar, adjust appearance, to navigate and use chat and voice for communication. Depending on the course objectives, some courses also expected students to demonstrate skills in building, terraforming, machinima and training of others in the virtual world.

*Guideline 2: Be specific in the level of skill development students are required to achieve in the virtual world. Clearly state whether students are required to have build skills or whether they are using facilities developed by others. If students are required to build in the virtual world, ensure that they have access to sufficient training opportunities.*

Activities noted from the case studies and survey responses as being particularly well suited for the 3DVLE environment include:

- ethnographic field research
- investigations into human-computer interactions



- practice feedback
- field trips
- group work, discussions (synchronous and asynchronous)
- practicing linguistic skills to negotiate completion of tasks.
- interviewing, reporting
- recording audiovisuals or text
- experiments.

The following benefits of the use of 3DVLEs for students were evident from analysis of survey responses and case study data:

- providing opportunity to gain practical experience in the virtual world
- experiencing geographical data
- developing creative skills
- exploring their own characters
- increased awareness of their impact on other people
- increased familiarity with virtuality
- developing ethical understandings
- developing enhanced levels of metacognition
- increased independence and creativity as a learner
- providing a sense of community
- increased understanding of employment opportunities
- improving transferability of skills
- encouraging greater empathy
- providing opportunities for meaningful communication
- increased understanding of self-efficacy
- providing opportunities to gain experience in areas that are too dangerous, costly or time-consuming.

An additional benefit identified by students in the evaluation of the ECU case study (Case Study 2.2) was that having an avatar as a librarian would allow some breakdown of the stereotypical librarian, as being sedate, female and middle aged.

The potential benefits of the platform were not realised in the offering of the course Design for Interactive Multimedia (Case Study 2.3) because of students' preconceived notions about the suitability of the platform. This suggests students were more focused on wanting to learn a particular set of skills (ie flash game design) rather than the more generic skills the activities fostered such as team work, communication and problem-solving.

*Guideline 3: Ensure that the learning activities, assessment items and learning objectives are aligned and clear to students. Explore the use of learning activities that maximise the unique affordances of 3DVLEs and avoid replicating activities that might be better conducted in the physical classroom or using other technologies in the case of distance education.*



### 3.2.4.1 Ethics

Expert responses to a hypothetical scenario focusing on ethical conduct of research in 3DVLEs (see Appendix 4.1) were received from:

- Gary Allen, Senior Manager, Research Ethics and Integrity, Griffith University, Australia
- Elizabeth A. Buchanan, Professor and Director, Center for Applied Ethics, University of Wisconsin-Stout, United States
- Ian Maxwell, Associate Professor and Chair, Human Research Ethics Committee, The University of Sydney, Australia
- Melissa de Zwart, Associate Professor, Adelaide Law School, The University of Adelaide, Australia.

Contemplating research ethics in virtual worlds entails extending, questioning and sometimes contradicting wisdom developed for real worlds. This poses significant challenges for ethics codes and guidelines that are already struggling to extend their reach throughout the real world. As social networking, hyperblogging, folksonomies, Wikis etc. continue to change social interaction, research itself, and thus research ethics, must change (Buchanan 2011, p. 103).

While there is now an emerging literature on online research ethics, including the Association of Internet Researchers' 2002 publication 'Ethical Decision-Making and Internet Research', the research ethics literature in relation to virtual worlds remains underdeveloped. Compared to other internet-based research, there are reasons to believe that virtual worlds may raise different issues for researchers in part because they have a greater resemblance to a real world environment.

Given the development of new media, with their accompanying shifts in the ways identities are mediated, it is not unusual for jurisdictional boundaries to be transcended and social boundaries transgressed. Online researchers have had to tread carefully, learn appropriate social norms and negotiate ethical research conduct with the people who occupy the spaces that are being studied (Grimes et al., 2009). This is particularly appropriate in virtual space which 'is heterogeneous, and, though the fundamentals of it have been provided by designers, it is equally constituted by the presence of human agents' (Rosenberg, 2010, p. 28).

There are several ways social scientists might locate themselves as researchers of virtual worlds. First, the world might be created specifically to allow external observation. Second, the researcher may be engaged as a participant through his or her avatar. Third, researchers might access logs and records generated through activity within the virtual world (Reynolds & de Zwart, 2010).

#### Informed consent

The principle that researchers should have respect for persons is often interpreted as requiring social scientists to obtain consent from participants. Traditionally, in many jurisdictions, regulators have assumed that informed consent involves investigators distributing information sheets to prospective participants, explaining the nature of the study and obtaining voluntary and informed consent. Participants' consent is often documented using a form that may then be signed by the participant. In *Second Life*, participant information forms can be provided via a notecard, but there is currently no way for an avatar to sign the notecard. Instead, Boellstorff (2009) asked participants to send him a message indicating consent, and this was a practice adopted by one of our commentators:

Informed consent will require modification to suit the individual platform, but a written form should be sent through the relevant chat or text channels. In [*Second Life*] I have taken



screen shots of this occurring. (Melissa de Zwart)

*Guideline 4: In general, researchers should ensure informed consent is obtained from avatars participating in research. Informed consent may take the form of a response to notecards provided to the avatar, but there may be alternatives. Human research ethics committees need to understand the conventions of the contexts of particular parts of virtual worlds if they are to assess the appropriateness of different approaches to informed consent. No one approach will be appropriate to all research in a virtual world.*

Although use of a written form is a common practice in real world environments, it is not the only way of recording consent. Various researchers have filmed or taped consent or have, like Melissa de Zwart, in virtual worlds used a hybrid approach. In other cases, participants' consent has been assumed from their decision to take part in the research. In many research practices, informed consent does not take place at just one point but is part of an ongoing negotiation. There seems little reason to believe that such a continuing approach would be inappropriate in the virtual world as well:

... rather [than] the simple transaction of a form that is signed there may need to be a careful discussion about confidentiality, to ensure there is a shared understanding of how comments and information will be reported, the measures to ensure confidentiality, and any limitations to those measures. There of course will probably still need to be a form – but probably one with optional clauses that are agreed between the student and potential participant. There might need to be a step to reconfirm consent later. (Gary Allen)

While the principle of informed consent of course also operates in virtual worlds, as Elizabeth Buchanan notes additional challenges may arise. In most cases, avatars appear to and actually do constitute participants for the purposes of human research:

On a virtual island, obtaining consent presents logistical, regulatory, and disciplinary challenges; the researcher is of course aware that he/she is interacting with an avatar. An avatar meets the traditional regulatory conditions of a 'human subject,' if a living person's behavior is being observed through the actions/interactions of the avatar, and information about the person/avatar is being obtained for research purposes, or if identifiable private information about a living person is being obtained through some research activity, and thus, consent is an integral component. This will change if the avatar is controlled by a bot, which may not fall under a human subjects criteria, however, so a researcher must be fully aware of the types of interactions he/she is having on a virtual island. (Elizabeth Buchanan)

Throughout the research, the researcher may not know who the real person is. However, this is not an unusual situation for many disciplines:

... this is the inherent methodological risk of many fieldwork disciplines: 'is this person really who they purport to be?' is not a question that arises only in virtual environments! (Ian Maxwell)

In the same way that practices of negotiating informed consent should differ in the real world depending on the methodology adopted and the nature of participants, so we ought to expect variation in the virtual world. Indeed, Rosenberg (2010) has suggested that people have quite widely varying expectations of negotiation in *Second Life*:

Three basic standpoints can be identified in relation to where people draw the line for intrusion or exploitation... The first group states that they do not ever want to participate in any type of research without informed consent. The second group holds that





researchers may observe and collect data without consent as long as they don't interact or interfere. The third group thinks that it's acceptable to collect information and interact without consent, but they say that researchers must not deceptively develop close relationships with people to gain information. Furthermore, it appears to be a general assumption shared by all three groups that names and quotes are not to be used in research publications without informed consent. (Rosenberg, 2010, p.32)

*Guideline 5: Consent to undertake research should also be obtained from the proprietor of the platform. Researchers who enter virtual worlds as participants will be expected to comply with the End User License Agreement and/or the Terms of Service Agreement generated by the virtual world provider. They may also have to consult the owner of any virtual real estate such as an island.*

Various researchers have sought to interpret the range of public and private spaces, residents and interactions in virtual worlds, in order to assess the degree to which informed consent needs to be negotiated and what matters these negotiations might cover (McKee and Porter, 2009a; 2009b). Not surprisingly, conclusions about what might be appropriate ethical conduct for research have been context-specific. Boellstorff (2009) noted that covert observation and breach of privacy are all too easy in the virtual world:

... in the context of the internet there appears to be little remaining expectation of privacy. Typically residents knew that anything that they said could be recorded by Linden Lab, by residents nearby, or by a scripted object hidden on a piece of land, and that such information could be disseminated via a blog or other form of website. (Boellstorff, 2009, p.82)

As Boellstorff acknowledged, there are now some opportunities and conventions relating to overt and covert, and public and private that have been established in the virtual world that might seem somewhat bizarre in the real world:

For instance, a participant observer on an island will make him/herself known through an array of strategies. Some wear 'hats' or wear shirts which identify themselves as researchers. Others will approve an individual and hand them a card or token, inviting them to a consent room, where they can discuss the research and review an information sheet or consent document. Others will have a recruitment island, where the researcher awaits participants, based on a script or recruitment posted elsewhere. (Elizabeth Buchanan)

Researchers who enter virtual worlds as participants will be expected to comply with the End User License Agreement and/or the Terms of Service Agreement generated by the virtual world provider (Reynolds & de Zwart, 2010).

Given that the hypothetical case involves the collection of data on virtual islands run by various universities, a researcher might also be expected to obtain permission from the proprietor of the platform:

That consent may be implicit in the User Agreement (or similar). The bottom line, however, is that the virtual world is a corporate space, so permission should be sought to conduct research in that environment... The big problem there would be identifying a responsible authority able to grant that authority. (Ian Maxwell)

In addition, the universities themselves also have a legitimate expectation that they will be consulted:

A researcher seeking to recruit students in a real world campus for such a research project would be required to seek such an endorsement, generally from a Provost/PVC level officer and, additionally, would be well advised to seek ethics ratification of their own



institutional ethics approval by the institution in which the research is to take place. (Ian Maxwell)

## Confidentiality

In this hypothetical case, students have been conducting research within a series of small social groups. As part of informed consent discussions, the researchers indicated they would endeavour to maintain anonymity of the virtual islands, the institutions and individuals. It seems, however, that this has been accompanied by a noteworthy caveat – there is a good chance that individuals within any one virtual island might recognise or identify one another through the work's outcomes. To some extent, the researchers have promised what Tolich (2004, p. 101) calls external confidentiality (that is, 'traditional confidentiality where the researcher acknowledges they know what the person said but promises not to identify them in the final report') while acknowledging that internal confidentiality ('the ability for research participants... to identify each other in the final publication of the research') is impossible to uphold.

If individuals participate in our research because they believe their confidentiality will be safeguarded, then serious ethical questions are raised if we fail to deliver on our assurances. In practice, even if pseudonyms are used, quotations or sufficiently rich descriptions may be identifiable by the other denizens of the virtual island. (Gary Allen)

Some research is problematic because of the case study design which makes it possible to deduce the identity of research participants once you know the location of the study. Involving several virtual islands and ensuring that participants know that multiple locations will be used, reduces the ease with which such deduction is possible. Participants ought therefore to be able to negotiate the degree to which they are identified:

It is incumbent upon the researcher to present options for identification for the participants within the informed consent process. Confidentiality, privacy, and anonymity assume different meanings across venues and across islands, depending on the contextual specificity of those spaces. Moreover, an avatar has an identity, which possesses a unique online reputation. That individual should be able to decide if he or she wants that identity presented in the research, or if a pseudonym for the avatar should be used. Thus, old, stock language used in traditional research which often says, 'We will protect your identity and only the researcher will be able to identify you with your data,' is an antiquated notion in online worlds in particular. (Elizabeth Buchanan)

Boellstorff (2009) decided to maintain confidentiality in his ethnographic study of virtual worlds—'Even when residents said I could name them, I have employed pseudonyms so as not to inadvertently identify their friends...' (p.82). He used pseudonyms for the virtual world identities of participants, paraphrasing quotes so that they could not be found using search engines, creating synthetic aggregates of groups of people, and altering any identifying details.

Our discussion of the possibilities of covert observation in virtual worlds has already raised the problem that researchers are not in a position to offer full confidentiality. Apart from facing the difficulty of avoiding eavesdropping within the virtual world, any data collected may end up on a remote server within a jurisdiction and subject to a variety of legal claims by organisations ranging from law enforcement agencies to the corporation that owns the servers.

So researchers ... would certainly not be able to vouch to participants that that data could not be accessed by a third party ... This is perhaps the most difficult and, I suspect, intractable ethical problem confronting research in this area: the ethical requirement to protect data – not the publication of that data as findings, but the data itself – from third parties. When that data exists, even momentarily, in a corporate space where that



corporation has not accepted an explicit contractual agreement to guarantee its security, then there is a profound ethical risk. (Ian Maxwell)

Researchers are generally expected to minimise risks of physical, psychological, social or economic harm or discomfort to participants in accordance with the principle of non-maleficence. In this example, there is no reasonable prospect of direct physical harm to participants in the virtual world. Although there may be a possibility of a researcher being present while a participant suffers emotional harm, this might be quite difficult to detect in the virtual world.

Given the existence of a variety of harmful behaviours in 3DVLE (to which we return in Hypothetical Three), the supervisor of the students and his or her institution has a responsibility to take reasonable steps to protect the safety of students:

... through both the provision of appropriate methodological and professional conduct training, and through the agreement of student and supervisor/teacher of a safety protocol that accurately and frankly assesses potential risk and puts in place processes for reducing those risks. (Ian Maxwell)

Research in virtual worlds can also be seriously compromised by the activities of parties external to the research – in this case, media, granting organisations, owners and managers of the virtual islands, where:

... the danger in researching in any virtual community is that the research, no matter how sensitively conducted, can direct too much attention to that community... (Melissa de Zwart).

We deliberately constructed this scenario to allow parallels with a similar hypothetical that one of the team had set in real life (Israel & Hay, 2006). In that exercise, two geographers maintained that researchers should anticipate how results could be made public and ought to take responsibility for the flow of information. Put bluntly, they concluded that it was not acceptable for researchers to criticise others for causing adverse outcomes while absolving themselves.

Researchers have an ethical obligation to fully disclose relevant information to potential respondents and ensure that their research is not misrepresented (Winchester & Rofo, 2006 cited in Israel and Hay, 2006).

Melissa de Zwart reached a similar conclusion in this virtual world scenario, noting that media reaction to behaviour in virtual worlds tended to be situated somewhere between the negative and the hysterical:

Most mainstream media only want the bad news, scary stories. So any interview granted to the media is likely, however carefully conducted, to repeat only the horror stories. Good news does not get reported. Therefore, it is very important to anonymise the virtual community as far as possible. I would suggest (although it won't help in this scenario) that the researcher avoids or minimises any contact with the media or discussion of the project, until it is complete. (Melissa de Zwart)

There are some [virtual world] focused reporters who could assist in correcting the report. The project web site should correct the misreporting. It could also offer a link for confidential correspondence with project participants with further questions. The strength of the researcher's ethical position may depend on the degree to which he or she was at fault in failing to anticipate the ways in which research results might be broadcast and failing to minimise the risk and negotiate appropriate consent.

In this hypothetical, the universities involved in the research reacted angrily to public statements about the research, blocked access to the virtual islands and demanded



that data not be published. Depending on the particular circumstances, the owners might have the legal authority and ability to prohibit a researcher from entering the virtual island, but whether they have ethical or legal domain over the data is another matter.

Complaints to the host company may have consequences if misconduct is linked to the researcher's university and the university holds real estate in that host's virtual world. In 2007 and again in 2010, *Second Life* administrators removed an island owned by Woodbury University in response to 'incidents of grid attacks, racism and intolerance, persistent harassment of other residents, and crashing the Woodbury University region itself while testing their abusive scripts' (Mistral 2007b). Independent commentators found it difficult to assess the level of the abuse but raised concerns about the lack of transparency in the abuse reporting process.

Melissa de Zwart suggested the researcher ought to contact the participants, the universities and the provider to defend the research project, countering the media's representation of the research and reiterating that data has been anonymised:

There is a danger that if the research attracts bad publicity your project can be shut down as a misuse of the platform. ...I would provide the consent form to the provider and explain that the outcomes identified in the media could not be released under the terms of the research project. (Melissa de Zwart)

However, Ian Maxwell concluded that matters had progressed well beyond the point at which an individual researcher might sensibly respond without the support of his or her institution:

I would urge that researcher to immediately notify the relevant ethics committee about the problems that arose, so as to at the very least garner institutional support and protection. If the research proposal has been properly designed, approved and documented, then there will be resources that will significantly take some of the heat, including access to legal counsel to help deal with the various corporations. I would advise, strenuously, against trying to take on corporations without that institutional support. (Ian Maxwell)

*Guideline 6: Ensure participants in research understand the limitations to the confidentiality that can be assured by the researcher.*

*Guideline 7: As in the real world, researchers should attempt to anticipate the use that may be made of their data and consider strategies to mitigate risks and minimise harm.*

### **3.2.4.2 Student probity**

Expert responses to the hypothetical scenario focusing on student probity 3DVLEs (see Appendix 4.2) were received from:

- Tracey Bretag, Senior Lecturer, School of Management, University of South Australia, Australia
- Julianne East, Lecturer in Academic Language and Learning, Curriculum Teaching and Learning Centre, La Trobe University, Australia
- Ian Maxwell, Associate Professor, Faculty of Arts, The University of Sydney, Australia
- Lee Partridge, Assistant Professor (Higher Education Development), Centre for Advancement of Teaching and Learning, The University of Western Australia, Australia.

Many universities have policies for students that include guidance on academic integrity although, in Australian universities at least, there is wide variation in the



nature of and inconsistency in the implementation of these policies in relation to plagiarism (Bretag et al., 2011). Julianne East concluded that institutions ought to be able to say that:

... we see communication of our stance on academic integrity as vital. We will continue to look at ways to communicate the message that academic honesty is valued while cheating will be severely penalized. (Julianne East)

Internet and Web 2.0-based communications marks an evolution in the process of authoring, a cultural transformation, by blurring the boundaries between (among other things) formal and informal communication, and creators and consumers of text. As a result, these 'dialogic, multivoiced, mercurial new forms' of communication (Gray et al., 2009, p. 117) pose a challenge both to existing institutional policies and to the ability of academics to explain authorship conventions. Sigthorsson (2005) concluded that

Plagiarism, far from being some sort of Internet-borne plague on the house of education, is a symptom of an emerging mode of reading and writing as usage — as participation in the creation of a social network of texts... (paragraph 8)

Despite these challenges, few institutions make explicit reference to virtual worlds in their academic integrity policies. Unusually, Memorial University in Canada warns students that 'academic and student behaviour guidelines, policies and codes of conduct, including academic integrity are in effect when you are academically engaged in Second Life' (Memorial University, 2011). However, within study guides, many coordinators do remind students of the relevance of generic policies when they engage in courses that involve working in the virtual world. On the other hand, we found little evidence that institutions had felt any need to reflect on the extent to which their generic policies fit the particular circumstances of virtual worlds.

Writers such as East (2009) and Bretag et al. (2011) have pointed out that effective strategies to promote academic integrity need to move beyond policy. Academic integrity should be:

... dealt with as a whole of institution concern, where teaching practices, texts, advice, assessments and penalty process are aligned. Rather than a simple approach of informing students that a policy exists and then penalising, or ignoring those who get it wrong or do not meet expectations, a whole of university approach would be multi-pronged and systematic. Such an approach would not only mean the presence of a policy which details responsibilities, it would also mean taking action to apply policy. (East, 2009, A-39)

While the principles need to be upheld in policy, they also need to be enabled in practice via teaching and learning activities and formative feedback on the success or otherwise of students' academic writing, as well as administrative processes that respond to breaches of academic integrity (Bretag et al., 2011, p. 2).

Bretag et al. (2011) discovered a marked shift in policies at Australian universities away from simply punishing academic dishonesty and towards promoting a culture of academic integrity. They argued that policies on and practices that promote academic integrity need to be embedded as learning outcomes in the curriculum and identified as marking criteria within any assessment. As part of the Asia-Pacific Forum on Educational Integrity, these authors have urged a multifaceted strategy to support 'educational integrity' and its attendant 'values of honesty, trust, equity, respect and responsibility' through processes that engage 'all those in the educational enterprise, from students to parents, instructors and administrators' (APFEI, 2010).





One strategy has been to require all students new to an institution to receive training and demonstrate their understanding of academic integrity. For example, The University of Western Australia has required its students to complete Academic Conduct Essentials (ACE), 'the purpose of which is to inform them of their responsibilities regarding ethical scholarship' (Lee Partridge). La Trobe University has also introduced online academic integrity units for students and staff, and 'in this way is communicating a whole of university approach to ensuring an environment which supports academic integrity' (Julianne East).

## Authorship

Several educators that we surveyed suggested they were unlikely to face a problem of author-substitution because they trusted their students, were present in the classroom when their students were online or, because they were working with a small class, they knew the capabilities of all their students. As a result,

... it would surprise me if suddenly high quality content pops into existence out of thin air (Survey respondent 6, United Kingdom).

Other commentators were less convinced. While using avatars as proxies for students might seem to make the matter of author substitution a particular problem for virtual worlds, several commentators pointed out the issue is just as much apparent in the real world, particularly in those institutions with high student to staff ratios, high levels of casualisation and also, perhaps, for those that are engaged in purely distance learning.

This issue is not unique to 3DVLE. Gone are the days that a student submits the hard copy of an assignment to their tutor/marker following extensive interaction and feedback on drafts during class. In today's classroom, where large numbers of students may be taught by sessional staff who rarely have the opportunity to interact with students on a personal or face-to-face basis, it is very difficult to authenticate the identity of those who submit assignments. This is the case for 'traditional' assignments submitted in hard copy as well as for those assignments submitted in 3DVLE (Tracey Bretag).

I do not think that this example is a million miles away from examples from what might happen in non 3DVLE contexts. We know that students access essay factories, commissioning bespoke essays and assignments for relatively low cost. And of course no amount of text-matching software is going to be able to identify such work as being examples of academic dishonesty (Ian Maxwell).

*Guideline 8: Universities should reflect on the extent to which their generic policies, including those relating to academic and student behaviour and academic integrity, fit the particular circumstances of virtual worlds. Until students become used to seeing virtual worlds as an extension of their university lives, students should be reminded about the operation of these policies at the beginning of units that make use of 3DVLEs.*

## Academic integrity

For Lee Partridge, the scenario would act as a trigger to reconsider the operation of her institution's academic integrity policy. In fact, even the request that colleagues work through this hypothetical scenario may have already had an effect on institutional policy. One commentator reported that 'in doing it I noticed some areas of our policies which are a bit fuzzy, so I will be following them up with the appropriate quality assurance committee'.

There may be several ways of minimising the possibility of copying other assignments, by paying attention to the construction of assessment. For example,



we might set unique assignment topics for individual students or groups and build features that change between classes, or triangulate marks against other forms of assessment such as oral presentations or unseen written examinations to identify anomalies.

I give assignments that involve individualized stages of work delivered over time to prevent plagiarism and false entry by doppelgangers' (survey respondent 17, United States).

...we talk to them afterwards and hold face to face [sic] interviews with them about their experiences (survey respondent 33, Australia).

In the future, if we offer our whole curriculum in online mode and have students doing tutorials (as against our task-based lessons) in SL, we would make them do certain assessment at a designated, invigilated site, particularly end-of-semester assessment (survey respondent 32, Australia).

Indeed, several commentators pointed out that plagiarism and ghost authorship are more likely if the academic coordinator has not invested time in designing thoughtful assessment:

Regardless of the learning environment, this hypothetical situation would only occur if the assessment task remains unchanged from semester to semester. The simplest way to address this issue is for all curriculum developers/course designers to be aware that students can and will recycle assignments from one semester to another in the form of offering 'assistance' to their junior colleagues. A lazy curriculum designer who uses recycled assignments encourages a similarly lazy response from students. However, even the most innovative assessment task in a given course aims to assess students' knowledge of similar concepts. Some students will be tempted to ask their senior colleagues to 'help them out' but in that case, the changed nature of the assessment task should alert the marker to potential plagiarism, and this should be investigated following the institution's academic integrity policy (Tracey Bretag).

... one way to at least approach addressing this is to think about assessment design in a way that makes doing the work perhaps easier than commissioning someone else to do it. This could involve staging assessment tasks so that plans, drafts, outlines are submitted regularly, that some contact hours are given over to working with this material (rather than in simply delivering content) and engaging with students as they work: asking students to rough out plans, or to draft paragraphs in class time, to share and reflect upon each others' work and so on. I would not want to claim that such techniques could solve the problem, but simply setting an essay topic and a date for submission just makes it too easy for the students who are at risk of adopting dishonest practices to do so (Ian Maxwell).

Students may be asked to sign declarations stating that the work that they are submitting is their own:

The uniform use of assignment coversheets which require students to sign they are submitting their own work (used extensively but not completely in the real learning environment) should be available and required in the virtual environment (Lee Partridge).

*Guideline 9: Assessors should build features into their assignments that promote academic integrity or reduce the possibilities of academic dishonesty.*

Security features can also be incorporated into assessment to limit the possibility that other people are producing work on behalf of a student. In the same way that students may be asked to produce identity cards before sitting an exam or provide



and comment on a portfolio of work that led to the final product, students submitting 3DVLE-based work can be required to produce annotated screen-shots of the process of creating the work. There is also software that can police the process.

Teachers are present in the room when the assessment is conducted. An application records the image of the student in front of the screen. Fraps records the interactions. (Survey respondent 31, Australia).

Activated by a fingerprint, commercial software can be used to act as an invigilator. Marketing materials for one piece of software reveal that it:

... provides access to available exams, and also locks down access to other resources that might be on the computer – Internet, email, files, etc. The student has access to the test and only the test. The camera in the unit records a 360-degree real-time video and audio view of the environment during the entire exam. Movement, other than the expected typing away at the keyboard, is transmitted to the professor. The result: the professor knows that the person taking the test is the student, and she isn't getting any additional help from friends in the room. Or not, as the case may be (Software Secure, 2011).

### Intellectual property

If students are copying material found on the 3DLVE, this raises questions of intellectual property. Creators in *Second Life* have found that avatar appearances and objects that they have created for sale have been replicated by CopyBots, without permission, for resale elsewhere in the virtual world. This poses significant challenges for the *Second Life* economy. After all, this is an environment whose entire economy is based solely upon intellectual property.

While popular virtual world, *Second Life*, is easy to work with and free for educators, it is limited in its ability to identify the user...; in addition, there is little, if any, control over the appropriateness of the avatar. Other virtual worlds use local servers, meaning the university would have full control and only its faculty, staff, and students could use it, but there is still the issue of being able to verify the identity of the tutee... Another option is for the university to create its own virtual world; while this process is time consuming, it does allow for the institution to have full control and to include all the necessary safeguards. (Ramirez 2009)

Once questions about authorship have arisen, Julianne East would expect 'the teaching staff have taken the immediate action of checking students' records for discrepancies in exam marks and take home assignments'. Several commentators also discussed how their organisation encouraged students to report academic misconduct, and how the organisation would respond to breaches of academic integrity. However, their responses did not indicate any departure from policies adopted in the real world environment.

*Guideline 10: Course coordinators should ensure students understand how to acknowledge the work of others in the virtual world, so that plagiarism does not occur through unfamiliarity with conventions.*

*Guideline 11: Where necessary, course coordinators need to be able to determine that the student is represented by the avatar they claim to be.*



### 3.2.4.3. Student behaviour

Expert responses to a hypothetical scenario focusing on student probity 3DVLEs (see Appendix 4.3) were received from

- Helen Farley, Lecturer, Australian Digital Futures Institute University of Southern Queensland Toowoomba
- Scott Grant, Monash University
- Henry Jenkins, Provost Professor of Communication, Journalism, and Cinematic Arts, joint professorship at the USC Annenberg School for Communication and the USC School of Cinematic Art
- Mark Lee, Charles Sturt University
- Wade Halvorson, Assistant Professor, Marketing, UWA Business School, The University of Western Australia
- Ian Maxwell, Associate Professor, The University of Sydney
- Barbara Spears, Senior Lecturer, School of Education, University of South Australia
- Janyth Ussery, Texas State Technical College
- Dale Wache, Academic Developer, Learning and Teaching Unit, University of South Australia
- Ian Warren, Deakin University

Balkin (2004) describes three kinds of freedoms in virtual worlds, which include ‘the freedom of the players to participate and interact with each other in the virtual world’ (p. 2047); ‘the freedom of the game designer to construct the virtual world and run it in the way that he or she sees fit’ (p. 2048); and the freedom of the players to collectively create the platform and define the rules of the game (p. 2051) as in the case of open source virtual worlds (for example *OpenSim*). Balkin points out that even though players have the right to participate and interact with each other in the virtual world, internal community norms and structures often govern what is deemed acceptable behaviour.

### Standardised contracts

Since the designer or owner of the platform (for example, *Second Life*) has the freedom to define the rules of the game, participants of a given platform will also be bound by the Terms of Service (TOS) or End User Licence Agreement (EULA). As Warren and Palmer (2010) point out, while such standardised contracts can give rise to concerns about the control exerted by the site administrators, these agreements nevertheless do provide the means for ensuring that users are aware of the conduct expected of them ‘in-world’.

The majority of respondents to the survey of academics teaching in 3D virtual worlds were conducting their classes in *Second Life* (65.6 per cent), a commercial platform operated by Linden Lab). One (3.1 per cent) respondent reported using another provider service, *ReactionGrid* (based on an *OpenSim* platform), and the remaining respondents reported using either *OpenSim* (an open source 3D platform) (12.5 per cent), or a combination of *Second Life* and *OpenSim* (18.8 per cent). Thus, all but four of the respondents reported that they are teaching in virtual spaces requiring that they and their students abide by the Terms of Service of the provider. For example, Linden Lab’s TOS governs eligibility to use the platform, registration requirements, payment of fees associated with using the service, IP and community standards (see <http://secondlife.com/corporate/tos.php>). These standards forbid acts of ‘in-world’ intolerance, harassment (also known as ‘griefing’), assault, disclosure,



indecentcy and disturbance of the peace (Chesney et al. 2009).

## Induction

Helen Farley highlighted this responsibility in her response to the scenario stating that 'if students had signed up for a *Second Life* account, they are already bound by the Linden Lab terms of service which expressly forbids the kinds of activities outlined in the scenario'. This suggests the need for an induction process for students as proposed by Ian Maxwell. Such an induction should also ensure students understand the reason that teaching and learning activities are being conducted in the 3DVLE to give them sufficient motivation to respond in an appropriate manner.

Similarly, academics new to teaching in a 3DVLE also need some form of induction into both the pedagogical affordances of such environments as well as the strategies they can adopt to minimise class disruptions. These strategies might also include use of 3DVLE administrative tools to restrict certain behaviours. As noted by Janyth Ussery, virtual environments offer different levels of control that enable region administrators to secure parcels of land to only those students who are enrolled in the appropriate course. They also have the ability ban or eject non-compliant individuals.

The *Second Life* Wiki ([http://wiki.secondlife.com/wiki/The\\_About\\_Land](http://wiki.secondlife.com/wiki/The_About_Land)) provides comprehensive instructions on the various controls available for owners of land. These include the deeding and selling of land, creating a covenant in order to establish a set of rules for the region, and setting permissions to either allow or ban certain activities such as editing terrain, creating landmarks, flying, creating objects, restricting entry of objects and scripting. Region owners can also restrict behaviour that might cause disruption on the region or lead to harassing behaviour. For example *Second Life* controls allow the owner to determine whether the land is set as 'safe' (no damage) and whether pushing is permitted.

## Specific policies governing behaviour in 3DVLEs

Of the academics that responded to the survey, 65.6 per cent reported that they also have specific policies in place governing student behaviour in 3DVLEs. Similarly, several respondents to the hypothetical scenarios outlined policies they would or already employ to minimise incidences of disruptive student behaviour. Some respondents stated that they have guidelines specific to classes in the virtual world, while several recommended that these can be incorporated within existing institutional policies governing rights and responsibilities of staff and students. Barbara Spears suggested that such policies should 'reflect the notion of adult learners in a non-compulsory post school setting' and avoid draconian measures in response to incidences of student misbehaviour.

The value of engaging students in the process of framing policies was highlighted by several respondents to the scenarios. As Henry Jenkins noted:

We've found that whether we are working in virtual worlds or traditional classrooms, the first step should be to engage the students in a collective process of defining the norms which will shape their interactions together. We find that shared norms rather than rigid rules allow you to deal with situations which defy simple black and white definitions (Henry Jenkins 2011).

Similarly, Helen Farley suggested that students should formulate the rules and decide what penalties would be applied for breaching the agreed upon policies. In that way, she argues, students will take ownership for their own behaviour and the rules by which they abide.





*Guideline 12: Ensure students are advised either verbally or in writing about the code of conduct in the 3DVLE, which should relate as closely as possible to university policies about behaviour on campus.*

### **Uniqueness of 3DVLEs**

Conflicts can arise when there is tension between the rights of the user to 'play' and the rights of the service provider to govern the behaviour of players (Balkin 2004). As Cheal (2007) notes, since these kinds of environments promise 'a place where there are no limits', the governance of virtual worlds such as *Second Life* is ambiguous. Moreover, as Warren, Palmer, King and Segrave (2008) point out, generic codes of behaviour can undermine the autonomy of educators and have the potential to inhibit innovative educational development within these environments. The case of Woodbury University whose *Second Life* region was closed by Linden Lab for violation of the TOS in July 2007 illustrates how these tensions are of particular concern for educators who are embracing such virtual spaces to provide opportunities for students to engage in creative activities, role plays and to experiment with social relationships (Clift 2007, cited in Mistral 2007).

In his response to the hypothetical scenarios, Ian Warren pointed to the need for devolution of policies, away from the institutional level and back to the individual academic, who is better positioned to regulate variants of such behaviours:

...individual teachers are adopting these platforms to encourage students to experiment with issues such personal identity (through dress), new forms of linguistic communication (msn messaging), and the basic functions of the platform (flying) (Ian Warren).

The notion of the unique affordances of the virtual world and the need to ensure that policies do not restrict the value of these environments was reflected in the responses of several academics. Wade Haverson pointed out that part of the pedagogical value of taking students into the virtual world is to open up their imaginations. Thus, as Henry Jenkins pointed out in his response, some of the examples of student 'misbehaviour' highlighted in the scenario may be inappropriate in some contexts and not in others. Jenkins suggested, therefore, that 'the goal should not be to impose discipline to the level that you disavow many of the distinctive features of the virtual world, forcing it to conform to the regimentation of traditional classroom practice' (Henry Jenkins 2011).

*Guideline 13: Staff member should regularly check sim to remove illegal or inappropriate content.*

*Guideline 14: Provide FAQs on what can and cannot be submitted, e.g. no content that breaches copyright, privacy, harassment, discrimination, defamation, antispyam or obscenity laws. Give examples of inappropriate content so students have context.*

### **Dealing with student misbehaviour**

There were 14 (43.8 per cent) respondents to the survey of academics that reported some incidents of student misbehaviour while teaching in virtual worlds. These incidences included students removing their clothes, disrupting classes, using virtual weapons, spamming and gratuitous rezzing of objects (including 'flying penises'). Some academics also reported incidences of disruptions caused by unwanted intruders. Most academics who responded to the hypothetical scenarios reported that they rely on the established policies to counsel students about such breaches of policy, and several pointed out that the response should be handled in the same way as misbehaviour would be handled in real life. Some respondents suggested turning disruptive activities into learning opportunities. Scott Grant also highlighted the importance of providing students with information in advance about how they should deal with confronting issues that could arise 'in-world' as an effective strategy



for ameliorating the effects of bad behaviour. Mark Lee noted that in the case of cyberbullying, the bully may also be in need of counselling support to deal with low self-esteem and other emotional issues that might be contributing to their behaviour.

Dale Wache suggested the following practices might be employed to minimise the incidences of disruptive student behaviour while also maximising the benefits of these unique learning spaces:

- prepare/support students to participate in 3DVLE spaces by providing 3DVLE sessions in which students are introduced to the rules of being 'in world'
- encourage students to develop and agree on 3DVLE appropriate behaviours
- teachers should model the 3DVLE behaviours they expect of their students
- link professional practice (nurse, lawyer, engineer etc) to the 3DVLE space and encourage students to practise at being beginning professionals within the 3DVLE space
- include an assessment task early in the 3DVLE activity to reward students who demonstrate good 3DVLE citizenship or identify, monitor and further educate students who do not demonstrate good 3DVLE citizenship (Dale Wache 2011).

*Guideline 15: The staff member should go through the terms of use of Linden Labs with the students in the first class and highlight the points made above. If possible these points could be put written in plain English and placed online in the unit guide so students and staff can refer to this again.*

#### **3.2.4.4 Access and equity**

Expert responses to hypothetical scenarios focusing on student probity 3DVLEs (see Appendix 4.4) were received from:

- Peter Albion, University of Southern Queensland
- Des Butler, Professor of Law, Faculty of Law, Queensland University of Technology
- Sharon Collingwood, Department of Gender Studies, Ohio State University
- Norman Coombs, Easy Access to Software and Information, California
- Scott Grant, Monash University
- Jackie Marsh, University of Sheffield
- Damian Sweeney, Senior Learning and Teaching Consultant, Learning Environments, The University of Melbourne
- Julie Willems, Research Academic, DEHub: Innovation in Distance Education, University of New England

The Australian Government's widening participation agenda is in response to several reports highlighting the continuing inequalities in access to higher education and learning outcomes (Bradley, Noonan, Nugent and Scales 2008; Elliott 2010; James et al. 2008). While the Australian higher education sector set important precedents in 1990 in establishing an advanced equity framework (James et al, 2008), as the Bradley Report (Bradley et al. 2008) notes, '... those disadvantaged by the circumstances of their birth: Indigenous people, people with low socio-economic status, and those from regional and remote areas' (p. xii) remain under-represented in higher education.

As Australian universities position themselves to respond to the government's equity targets, there is growing recognition of the challenges facing educators as they



adapt their teaching and learning strategies to address an increasingly diverse student population (Creagh, Nelson and Clark 2011). As Elliott (2010) suggests, the strategies required to address such a diverse student population will need to overcome a range of barriers to regular on-campus study, such as geographic isolation for students living in remote regions, high mobility (particularly among rural Indigenous communities), economic barriers, family issues and disability related factors. Flexible learning options using digital technologies play a key role in expanding the options available for such students, and have '... the potential to include and engage students with multiple and complex needs that typically prevent access to traditional university programs' (Elliott 2010).

The growth in popularity of 3D virtual worlds combined with increasing access to mobile communications opens up new opportunities for engaging students from diverse backgrounds through such virtual learning environments. 3D virtual worlds have attracted growing interest from educators (see for example Gregory et al, 2010) who are keen to engage their students in a game-like environment that offers the potential for increased flexibility, enhanced collaborative opportunities and a safe environment for experiential learning activities (Wood and Hopkins 2008). As Wood (2010) argues, 3DVLEs have the potential to link those who are isolated by disability, geographical location and social circumstances through the establishment of virtual communities.

Several respondents to the academic survey commented on the benefits of 3DVLEs in reducing isolation and increasing a sense of community for students. Others noted the flexibility afforded by such environments and as one respondent noted, students studying at a distance felt that the environment helped them to feel more connected to the instructor. Similar comments were noted in the findings of the case studies. For example the coordinator of the Mickey to Manga course commented that distance students reported a greater sense of presence and connection communicating via the 3DVLE, as did the distance education students enrolled in library and information science courses offered at ECU.

Despite the potential of these e-learning technologies, several authors have cautioned about potential challenges in adapting new and emerging technologies within the curriculum (Carlson 2005; Hayes 2006; Kennedy et al. 2007, 2009; Mason and Rennie 2008; Mulholland 2008; Oblinger 2008, Wood et al. 2010). One of the more significant challenges, yet less evident in discussions about the pedagogical affordances of e-learning technologies, is the need to ensure that current and emerging technologies are accessible to a diverse student audience including learners with special needs and those in remote locations.

*Guideline 16: Choose the medium of interaction appropriate to the class size and convey the rules of that interaction to the students.*

One respondent to the survey of academics teaching in 3DVLEs highlighted such concerns arguing that 'until we resolve this issue we won't be able to get a greater acceptance of the use of VWs. It becomes a reason not to do it by staff and students'. Other survey respondents noted some of the technical limitations and/or difficulties for students in learning how to use the platform. Most respondents emphasised the importance of orientation training to address some of these difficulties and to also identify any technical issues. As one respondent described 'I spend a great deal of time on orientation, meeting students in groups of 5 or less, giving them a tour of the classroom, and an [sic] rundown of basic skills. This is crucial for the success of my course. Students often work in groups, and they automatically teach each other skills. I work the teaching of skills into my lesson plans'. Another respondent stated that 'you cannot expect students to come to the class with similar skills/experiences, so it is important that all is clear and plenty of options are available for support beyond what I as the instructor can provide'. The



value of using peers as mentors was also noted in the responses of several survey respondents, and the value of mentors to support people with disabilities attending sessions in virtual worlds was also highlighted by two users with disabilities who participated in the review of the accessible 3DVLE.

While most of the survey respondents stated that their students could get access to high speed bandwidth either from home, on campus or local community centers, several strategies were suggested to avoid disadvantaging distance learners. These strategies include avoiding mandatory synchronous classes, providing flexibility in assessment and providing alternative participation options for students who cannot access the 3DVLE, such as the Sloodle 'in-world' chat logger, that allow access to chat sessions via their Moodle learning management system.

While most survey respondents focused on the issues facing distance learners, respondents to the hypothetical scenario noted similar concerns with regard to synchronous activities for learners with special needs. For example, Damian Sweeney noted that synchronous activities can also be challenging for students who have difficulty reading quickly or with motor control. Julie Willems also suggested that:

Not all students enjoy synchronous assessment tasks. Some like to take time to reflect on the situation rather than being required to respond or act in the immediacy of synchronous assessments tasks. Beyond preference or lack of enjoyment, students with learning disabilities (which is referred to as a 'hidden disability') find that synchronous or time-limited assessment tasks pose very serious challenges. They might need additional time requirements or additional equipment in order to participate. They may also need another person to physically take the assessment task on their behalf, guiding the proxy in their responses (Julie Willems 2011).

Respondents to the hypothetical scenario were largely consistent in their view that some flexibility is required to accommodate students with special needs and as Norm Coombs pointed out, students with disabilities should be able to apply for special consideration to accommodate their needs (such as allowing extended time to complete assignments) as with any other form of learning. Scott Grant noted that in designing synchronous assessment, care should be taken that all students, including those who may find the technology demanding, are accommodated.

*Guideline 17: Teachers should also provide students with the option to attend synchronous classes conducted in the 3DVLE via the Web 2.0 interface if they are unable to access the 3DVLE due to disability related issues, slow bandwidth or limited technologies available to them.*

Several respondents to the scenario highlighted the importance of ensuring students are made aware of the technical requirements for undertaking classes that are conducted in the 3DVLE so they can make an informed decision about whether to enrol in that class. As Des Butler suggested:

... as a matter of university policy, subject outlines or summaries should make clear that the subject will involve the use of a 3DVLE and the minimum requirements in terms of computer capacity. They should also detail the activities that will be undertaken in the 3DVLE and the types of risk to which they may be exposed. This should enable students to have an understanding of what they are committing to if they choose to study that subject and to make an informed choice whether to do so. Students should not be

"required" to undertake studies where they require computer equipment to which not all of the cohort may have easy access (Des Butler 2011).



*Guideline 18: Ensure students understand the minimum technology required for them to undertake learning activities conducted in a 3DVLE.*

*Guideline 19: Provide students with the option to undertake alternative learning activities and assessment tasks if they are unable to access the required equipment.*

Peter Albion highlighted the dilemma facing academics wishing to implement innovative technologies in their teaching and learning in his response to the scenario, noting that 'it would be tempting to drop the 3DVLE and opt for a lowest common denominator solution, perhaps traditional print and associated materials, that would be accessible to all'. However, as Albion explains, 'unfortunately, there would be a relative disadvantage to other students who are able and willing to use the 3DVLE and might gain some advantage thereby'. Albion's suggestion to address this dilemma is to '...adopt the Essential, Desirable, Optional design approach proposed by Hancock (2010) with the 3DVLE designated as desirable or optional'.

*Guideline 20: Ensure IT policies do not disadvantage students enrolled in courses requiring access to 3DVLEs. All students undertaking studies in 3DVLEs need access to the appropriate equipment on campus.*

*Guideline 21: Install AccessGlobe as an alternative viewer for students who find difficulty accessing the virtual world using standard viewers. Provide students with the option to attend synchronous classes conducted in the 3DVLE via the Web 2.0 interface if they are unable to access the 3DVLE due to disability related issues, slow bandwidth or limited technologies available to them.*

Users with disabilities also identified several strategies that can be employed by teachers conducting classes in 3DVLEs to improve the accessibility for students with disabilities. These strategies have been developed into the following set of guidelines.

*Guidelines 22-32:*

*Guideline 22: Provide note card descriptions to students 'in-world'.*

*Guideline 23: Conduct class sessions using both text chat and voice.*

*Guideline 24: If possible, arrange for a live captioner to be available for classes undertaken in the 3DVLE by students who are deaf.*

*Guideline 25: Ensure that text transcriptions for voice and audio are provided to students.*

*Guideline 26: Provide an option for users to register for events and indicate their accessibility needs in advance.*

*Guideline 27: Ensure support (for example mentors) is available during classes.*

*Guideline 28: Pace the learning activities to accommodate learners with diverse needs.*

*Guideline 29: Minimise distractions in the virtual space.*

*Guideline 30: Provide an Internet Relay Channel (IRC) so that users who cannot participate 'in-world' can participate via IRC (note the Web 2.0 interface accommodates this option).*

*Guideline 31: Ensure all videos displayed 'in-world' include captions.*

*Guideline 32: Consider designing the virtual space in a way that reflects accessible spaces in the physical world.*





### 3.2.4.5 Intellectual property (IP)

Expert responses to hypothetical scenario focusing on student probity 3DVLEs (see Appendix 4.5) were received from:

- Rob Chalmers, The University of Adelaide
- Melissa deZwart, Associate Professor, School of Law, The University of Adelaide
- Megan Deacon, Copyright Office, Monash University
- Annie Lennox, Senior Coordinator, RMIT Copyright Management Service, RMIT University Library, Royal Melbourne Institute of Technology
- Margaret Pembroke, Information Management Officer, Southern Cross University Library, Southern Cross University

Balkin (2004) argues that the acceleration of real world commodification of virtual worlds is one of the most important developments influencing the need for legal regulation of virtual spaces. This observation raises several issues of particular importance for academics who are teaching in 3D virtual environments.

First, as Balkin (2004) has pointed out, 3DVEs contain virtual goods created by other players that have real world value. Thus, such virtual objects are covered by intellectual property (IP) laws, and both teachers and students are bound to observe these regulations. However, as Kucharski (2007) cautions, since 3DVEs are global environments and populated by avatar personae of individuals whose real life identity may be anonymous, it is unclear which country the infringement of IP rights should apply. Thus, argues Kucharski (2007), enforcement of IP rights within 3DVEs is very difficult.

Second, 3DVEs such as *Second Life* are environments that encourage players to create their own content. Such content has value to both the individual creator (Dudley et al, 2010) and the provider of the service (in this case Linden Lab), since as the Linden Lab website affirms, the platform is 'a 3D virtual world created by its Residents' (<http://lindenlab.com/>). Moreover, as Kucharski (2007) points out, *Second Life* is one the few virtual worlds that enable users to retain IP rights for the content they create. However, all material developed in such environments resides on servers over which universities have no control. If a third-party company should close down its services, there is currently no way to export university owned and generated IP to another platform. There are reported cases of university owned spaces in *SL* being closed down (Mistral 2007a; 2007b) and of individuals having their accounts suspended and virtual land confiscated because they were deemed to be operating outside the company's Terms of Service (Bragg vs Linden Lab and Rosedale, see Dougherty 2007). Institutions losing access to their content have no right of recourse and are required to take legal action to reclaim their IP. As Humphreys (2005) observes, the Terms of Service (TOS) or End User Licence Agreement (EULA) contracts that govern such 3DVEs 'seem to be one-sided' and 'involve the waiving of various rights' (Humphreys 2005, p. 299).

A third issue facing academics teaching in 3DVEs concerns the potential for violations of IP regimes relating to copyright and trademark. As Balkin (2004) notes, users can upload items to the 3DVE that are protected by copyright or trademarks; a practice that is encouraged by the creative nature of the virtual world environment. This suggests the need for policies governing the use of copyright materials by both teachers and students, since once these items are uploaded to a public server the conditions of 'Fair Dealing' may not apply.

Coates, Suzor and Fitzgerald (2007) identify the following potential risks for users



interacting in 3DVEs such as *Second Life*:

- the behaviour of Platform Members within an organisation's virtual space
- infringement by other Platform Members of copyright and other intellectual property rights in the organisation's content by other Platform Members
- avoiding the infringement of copyright and other intellectual property rights in the objects and content created by other Platform Members
- secondary infringement of the copyright, moral rights, other intellectual property rights and privacy rights of third parties in content brought into the organisation's virtual space by other Platform Members
- defamatory or offensive statements being inadvertently made by the organisation or by other Platform Members in the organisation's virtual space
- underage persons visiting the organisation's virtual space
- the risks (uncertainty and insecurity) of relying on implied licences to reuse content, as opposed to the certainty and security afforded by express, open content licences for reuse of content
- liability for copyright infringement through audio and audiovisual streams.

There are currently no formal copyright guidelines relating specifically to 3DVEs used in education contexts. However, the Report of the ARC Centre of Excellence for Creative Industries and Innovation prepared for Smart Service Queensland in 2007 on Legal aspects of Web 2.0 activities takes a conservative stance (see Coates, Suzor and Fitzgerald 2007). University of South Australia staff who have knowledge of and expertise in the administration of copyright requirements agree in principle with the position taken in this report. They note in particular<sup>1</sup>:

- *Second Life* and similar third-party servers cannot be considered secure environments at the moment. As a general rule, permission will need to be sought to use third-party materials.
- Universities are advised to keep third-party material behind university firewalls if they are to rely on existing licences.
- Universities can link to material made available under existing licences if that material is made available and controlled through existing password authenticated links and that the material linked to resides either on a licenced access site or university repository.
- Linking to content not controlled by a university may put universities at risk as they may be viewed as infringing copyright by communicating infringing material to their students.
- Robust administrative arrangements need to be in place to ensure that only currently enrolled students or employed staff have access to third-party copyrighted material.
- University Copyright Officers need to be able to monitor content on 3D virtual servers in line with the recommendations of internal university audit report recommendations for online copyright.

On considering these broad outlines for managing and mitigating risk, our commentators all recognised the complexity of the IP issues and so their responses were similarly intricate and detailed. While they were very specific in suggestions for

---

<sup>1</sup> This advice is based on information provided by University staff who have knowledge of and experience in the administration of copyright requirements. The information does not constitute legal advice.



dealing with the problems and issues that may arise in the use of 3DVLEs, their main and overall strategy is education; universities should seek to raise awareness and ensure that all parties are fully aware of the TOS. This can be achieved through:

1. Educating the educator on copyright and technologies to educate the users/students on matters such liabilities with terms of service – TOS and copyright in plain English.
2. Creating and promoting policies guidelines and legislation compliance procedures.
3. Policies and procedures on virtual work compliance – regularly remind staff and students via email or web news (Annie Lennox).

Some responses focused on risk management practices, such as suggesting regular checks by staff to remove illegal or inappropriate content and the provision of FAQs on suitable material to ensure no breaches of copyright, privacy, harassment, discrimination, defamation, antispy or obscenity laws (Margaret Pembroke).

Melissa de Zwart advises that coordinators could draw on a number of specific choices to tackle some of the issues such as providing students with:

a range of materials, including textures etc which are created by the University, so they do not have to use third party material, and expressly forbid them from using any other material. You could allow them to upload material they need to use (and will you provide them with the Linden to do this?) and again stress this must be material they create themselves. Next level up would require them to source material in *SL*, but to use only material which they know is permitted by the creator/owner of the material (and to keep some records of how they have done this) This would be for a much longer term project (Melissa de Zwart).

Melissa de Zwart also recognised that as 'entry into *SL* requires the user (student) to enter into a contract with Linden' it was essential to inform the students that they could elect to 'opt out of that element of the unit if they wish' as the university 'cannot require a student to enter a contract with a third-party if they morally or ethically do not want to'. Similarly Annie Lennox was concerned that the teaching staff and students should be fully aware of the provider's Terms of Service (TOS) (such as those of Linden Lab) and fully understand the implications of the agreement, as:

Any IP your colleague creates for teaching purposes can be used by the company that owns the virtual world for any purpose they choose (Annie Lennox).

The TOS for *Second Life* are similar for all user-generated content sites such as YouTube, Flickr etc. The statement or licence provides the host site with rights and purposes needed in order to run the internet business or service. Yet it is important to remember that accessing content through the virtual world is very different to reproducing or copying content in the virtual world. Copyright law and the TOS restrict the reproduction of content within virtual worlds:

If an act of use, reproduction, distribution etc. takes place within the virtual world the university or the individual has the right to rely on the TOS and also Linden Labs DMCA Policy to have the work(s) removed. See <http://secondlife.com/corporate/dmca.php>.

It would be acceptable for staff and students to share content as part of the usual practice nature of sharing within academic communities, or as per the creative commons philosophy. However, for others outside of this community this could raise



a problem. Within the existing TOS 'the teaching materials and student work could be used by other users in SL unless your colleague and his students use the SL permissions system to set the 'copy, modify, and transfer settings on each object they create' (Annie Lennox).

*Guideline 33: As in the real world, researchers should attempt to anticipate the use that may be made of their data and consider strategies to mitigate risks and minimise harm.*

Interestingly, even this is not so straightforward, as within the policy concerning photography and video in *Second Life* further permission is required (*Linden Lab Official: Snapshot and machinima policy* - [http://wiki.secondlife.com/wiki/Linden\\_Lab\\_Official:Snapshot\\_and\\_machinima\\_policy](http://wiki.secondlife.com/wiki/Linden_Lab_Official:Snapshot_and_machinima_policy)).

IP policy concerning student's ownership of work differs from university to university and this of course equally applies to work created in virtual environments. It should therefore be made clear to the students that any material they create as part of the game environment could be reused by Linden Labs (Megan Deacon). Alternative assessment for those students who do not want to use *Second Life* of course then has to be available.

As students and staff become increasingly familiar with technological developments, including 3DVLEs and their use in the classroom the issues of IP, 'terms and conditions of access and general standards and etiquette will be significant and of pervasive importance throughout learning and workplace environments' (Rob Chalmers). As Chalmers suggested, '... we are likely to see some convergence around generally understood codes of behaviour - a little creative commons like'.

*Guidelines 34-46 relate specifically to strategies that universities can adopt to mitigate risks associated with infringement of IP rights in 3DVLEs:*

*Guideline 34: Universities are advised to keep third-party material behind university firewalls if they are to rely on existing licences.*

*Guideline 35: Universities can link to material made available under existing licences if that material is made available and controlled through existing password authenticated links and that the material linked to resides either on a licenced access site or university repository.*

*Guideline 36: Linking to content not controlled by a university may put universities at risk as they may be viewed as infringing copyright by communicating infringing material to their students.*

*Guideline 37: Robust administrative arrangements need to be in place to ensure that only currently enrolled students or employed staff have access to third-party copyrighted material.*

*Guideline 38: University Copyright Officers need to be able to monitor content on 3D virtual servers in line with the recommendations of internal university audit report recommendations for online copyright.*

*Guideline 39: The staff member should go through the terms of use of Linden Labs with the students in the first class and highlight the points made above. If possible these points could be put written in plain English and placed online in the unit guide so students and staff can refer to this again.*

*Guideline 40: Student should sign a statement confirming that they understand the*



*risks of using Second Life.*

*Guideline 41: Staff and students must be made aware that they cannot add, reuse or modify existing copyright works to add to Second Life. This is so even when their use of that material might be considered fair under fair dealing or in the case of the staff member, use for educational purposes under the CAL licence. The staff member should dedicate some part of the first class talking about this restriction with a couple of examples of what students can and cannot do.*

*Guideline 42: Clarify IP ownership issues. Do the students own copyright in their coursework? Does the staff member? Remind students of the Second Life reuse policy.*

*Guideline 43: Restrict access to the island to students in the unit only.*

*Guideline 44: Staff member should regularly check sim to remove illegal or inappropriate content.*

*Guideline 45: Get students to run content past the staff member before they add it to the island.*

*Guideline 46: Provide FAQs on what can and can't be submitted e.g. no content that breaches copyright, privacy, harassment, discrimination, defamation, antispam or obscenity laws. Give examples of inappropriate content so students have context.*





## 4 Impacts

As noted in the introduction, our review of the literature identified several challenges facing teachers wishing to conduct classes in 3D virtual worlds. These challenges include:

### 4.1 Ethical issues

As project team member Winthrop Professor Mark Israel (The University of Western Australia) suggests, the negotiation of ethics by academics is becoming more complex. This reflects both new methodological and technological patterns of working as researchers and teachers as well as broader social, political and economic shifts in our societies. The nature of 3DVEs and the use of avatars have raised further ethical issues including:

- the negotiation of informed consent, confidentiality, harm and benefit in a new environment
- the nature of the legal and moral persona that is doing the negotiation (issues of academic integrity may be particularly difficult given that difficulty of confirming the actual identity of the avatar)
- the misuse or exploitation of tutors' and students' technical expertise
- the development of an inclusive curricula which does not privilege those with access to more expensive technology
- the nature of the relationship between learners and educators.

*Guidelines were developed to address the ethical concerns facing academics utilising 3DVLEs in response to the documented need for researchers to address the social, legal and ethical issues relating to 3DVLEs (Hendaoui 2008).*

### 4.2 Legal and intellectual property

All material developed on third-party 3DVEs resides on servers over which universities have no control. If a third-party company should close down its services, there is currently no way to export university owned and generated IP to another platform. Moreover, there are reported cases of university owned spaces in *SL* being closed down (Mistral 2007a; 2007b) and of individuals having their accounts suspended and virtual land confiscated because they were deemed to be operating outside the company's Terms of Service (Bragg vs Linden Lab and Rosedale, 2006). Institutions losing access to their content have no right of recourse and are required to take legal action to reclaim their IP. There are currently no formal copyright guidelines relating specifically to 3DVEs used in education contexts.

*This project addressed these concerns by providing an open-source solution enabling academic institutions to host course materials to be accessed via 3DVLEs on secure servers while linking to the emerging education grids. These grids include ones such as those under development by Immersive Education (Media Grid, 2008) and OpenLife grid in Australia, enabling students to still access existing 3D worlds without compromising the academic institution's legal and copyright responsibilities.*



*Guidelines have also been developed in consultation with the University's and our partners' advisors to address the recognised need for policies regarding the management of copyright infringement and the imposition of enforceable contractual terms of use (Coates, Suzor and Fitzgerald 2007).*

## 4.3 Technology

There are several technological barriers facing universities in opening their server ports to those required for access to 3DVEs including:

- security issues: *Second Life* requires direct connection to third-party servers via a range of network ports and thereby entails an increased exposure to a potential risk of a variety of network attacks. This risk can be significantly reduced by hosting the 3DVLE within a secure university controlled network
- cost of bandwidth: The cost to universities connecting to external 3DVEs is substantial and in most cases debited against the student's Internet quota. Hosting this activity on campus (or via another on-net university site) would avoid these costs to both the institution and the individual students

server stability: The *SL* Grid Quality Metrics report available from the *Second Life* website documents both planned and unplanned service outages. Server stability continues to be a matter of concern with unplanned outages disrupting events and resulting in cancellation of classes. Linden Laboratories acknowledges a need for improvement and is seeking to improve the stability of its services.

*This project addressed these issues by developing an open source accessible 3DVLE which can be installed on a secure university operated environment and can provide the necessary infrastructure through mirrored servers to avoid such unplanned outages. In addition, guidelines have been provided to address some of the technological challenges experienced by teachers and students.*

## 4.4 Cost

While the fees for accessing 3DVE services are often discounted for educational institutions, there is a significant cost associated with both the initial purchase and maintenance of the virtual space. There are also fees associated with each individual item uploaded by a staff member or student to the public server.

*This project addressed this issue by providing academics with access to an open source accessible 3DVLE, enabling universities to operate their own 3DVLEs control the inventory servers and avoid the need to impose financial demands on students accessing their servers.*

## 4.5 Accessibility

There is a strong community of people with disabilities already participating in *Second Life* (e.g. 'Wheelies', which has members with mobility impairments). However, despite some exemplary research investigating third-party accessibility solutions for these environments, 3DVEs such as *SL* are still largely inaccessible for a number of students. As Kelle and Garcia (2007) suggest, the two main barriers to achieving accessibility in 3DVEs are technical and cultural:

- The design of accessible interfaces and tools to facilitate the development of



accessible content is an identified requirement for the achievement of a non-discriminative 3DVE (Kelle and Garcia 2007)

- There is a lack of awareness about the necessity to provide equal learning opportunities in 3DVEs for students with disabilities.

Yet virtual spaces are no different from real life spaces. It would be unthinkable to suggest a student should be prevented from attending a class in a physical space due to the failure of the institution to provide ramps and rails, yet effectively this is what education providers are doing by ignoring the accessibility barriers of third-party operated 3D virtual worlds. As Peters and Ball (2007) argue, when accessibility is a challenge in the first place (real world) and in its second place (Web 1.0), how we will meet the challenges of accessibility in the third place (Web 2.0 and 3DVEs) is still to be solved.

This project addressed these accessibility challenges by:

- extending our current research into the available accessibility solutions
- designing and developing an open source accessible 3DVLE with built-in features
- enabling authors to create accessible content
- providing a range of accessible 3DVLE tools designed to facilitate learner engagement
- developing guidelines for teachers conducting classes in 3DVLEs.



## 5 Success of investigation

As a collaborative project led by the University of South Australia with partner institutions including The University of Sydney, Edith Cowan University, RMIT, Monash University, and the University of Sheffield (UK), and one involving academics representing a diverse range of disciplinary fields, we were able to ensure that the case studies undertaken represented a cross-section of disciplinary areas. The collaboration also facilitated wider networks of academics who participated either from other faculties within the partner university or across other institutions. Such collaborations led to two academics (one from RMIT and one from the University of New England) submitting teaching and learning grant applications within their own institutions to carry the project further once the ALTC-funded project concluded.

### 5.1 Factors critical to success

Our collaboration with accessibility specialists, human rights representatives and people with disabilities ensured that the development of the open source platform was consistent with the requirements for learners with disabilities. It also enabled us to develop appropriate guidelines for teachers and developers of 3DVLES, to ensure the teaching arrangements for sessions conducted in virtual worlds are accessible and meet the needs of a diverse student audience.

Our reference group initially comprised of seven academics who were members of an informal user group established by AARNET. This was for teachers and technical developers who had an interest in the use of virtual worlds for teaching and learning. One of the reference group members was also leading another related ALTC funded project, which enabled us to contribute to each other's projects in a productive manner. In 2010 we joined the Australian Virtual Worlds Working Group (a network of some 160 academics representing 50 higher education institutions), opening up opportunities for extending our collaborations, contributing to additional cross-institutional publications and presentations, and harnessing the collective wisdom of the members of AVWWG through their responses to a survey. This helped inform the design of the guidelines produced through this project.

The award of the Telstra-TJA Christopher Newell Prize for Telecommunications and Disability, along with widespread dissemination via peer reviewed publications, conference presentations, seminars, workshops and media coverage led to many invitations to present as keynote speaker/s. It also invited papers at conferences, as well as an invitation to adapt the accessible 3DVLE for use in primary schools in South Africa, and to provide pre-service and in-service teacher training in both South Africa and Uganda. Thus the benefits of this project have been extended to an international audience and across the higher education and school sector in developing countries.

### 5.2 Factors that impeded success

The milestones originally anticipated sign-off on criteria and design specifications by the end of 2008. This proved unrealistic because the platform chosen for development was undergoing major revisions and given the other technological developments occurring during that period, we were forced to reassess the preferred platform for development. The challenges arose because 3D virtual environments are undergoing rapid evolution and it is very difficult to anticipate



some of the developments in advance. Instead, we must adapt to changes as they occur and leverage the benefits from all platforms to ensure maximum benefit to the higher education community.

Lead time for contract negotiation was not factored into our original milestones as we had pictured this process to be much less complex than it has turned out to be. The delays in finalisation of partner contracts impacted on the development of case studies and associated guidelines. Delays experienced as a result of two project team members taking up new appointments at other universities further contributed to the challenges.





## 6 Applicability to other institutions

The open source, accessible 3DVLE together with the guidelines developed through this project are relevant to all higher education institutions (and indeed primary/secondary schools) that are currently providing teaching and learning activities in virtual worlds.

The guidelines are also valuable for programmers and IT personnel involved in designing 3DVLES as well as those administering 3DVLEs on their own servers.

The guidelines relating to ethical considerations are relevant to researchers who are undertaking research in 3DVLES.

The guidelines relating to student behaviour, probity and student equity are also of interest to higher education policy makers.

The IP guidelines are of particular interest and value to Copyright Officers in higher education institutions.

Finally, as noted above, two academics that collaborated on this project have carried forward the skills they developed through their association with the project into new projects funded through internal teaching and learning grants.



## 7 Dissemination

### 7.1 Book chapters

Fewster, R., Chafer, J. and Wood, D. (2010) Staging Second Life in real and virtual spaces, in G. Vincenti and J. Bramam (eds.) *Teaching through Multi-User Virtual Environments: Applying Dynamic Elements to the Modern Classroom*, IGI Global, Hershey, PA, pp.217-235

Hickey-Moody, A. and Wood, D. (2010) Ethics in Second Life: Difference, desire and the production of subjectivity, in C.Wankel and S. Malleck (eds.) *Emerging Ethical Issues of Life in Virtual Worlds* Information Age Publishing Inc., New York, pp. 153-176

Phillips, M., Tour, E., Henderson, M. & Snyder, I. (2012) Giving students a 'Second life'. In T. Islam, O. Lee, J. Peterson & M. Piscioneri (eds), *Effectively implementing Information Communication Technology in Higher Education in the Asia-Pacific Region*. New York: Nova Science Publishers

Wood, D. (2010) The benefits and unanticipated challenges in the use of 3D virtual learning environments in the undergraduate media arts curriculum, in G. Vincenti and J. Bramam (eds.) *Teaching through Multi-User Virtual Environments: Applying Dynamic Elements to the Modern Classroom*, IGI Global, Hershey, PA, pp. 236-258

### 7.2 Peer reviewed journal publications

Bloustien, G. and Wood, D. (under review) 'Can I borrow your face for a minute?': Issues of aesthetics and bodily transformations in Second Life, *Body and Society*

Elund, J. Clayden, J. and Green, L. (2010) Getting to know your avatar in Second Life, *Australian Journal of Communication*, Vol. 37, No.2, pp.73-86

Hickey-Moody, A. and Wood, D. (reviewed and under revision) Steam-punks in a networked society: Differentiation, disability & Second Life, submitted to *Cultural Studies Review*, The University of Melbourne Press, NSW

Hickey-Moody, A. and Wood, D. (2008) Virtually sustainable: Deleuze & desiring differentiation in Second Life, *Continuum: Journal of Media & Cultural Studies*, Vol. 22, No. 6, pp. 805-816

Wood, D. (in press) Designing culturally inclusive curricula for virtual learning environments, in G. Vincenti and J. Bramam (eds.) *ICST Transactions on e-Education and e-Learning*, due for publication 2011.

Wood, D. (2010) Communicating in virtual worlds through a Web 2.0 application, *Telecommunications Journal of Australia*, Vol. 60, No.2, pp. 19.1-19.16, <<http://tja.org.au>> \* Winner of the Telstra-TJA Christopher Newell Award for the best paper demonstrating the tangible benefits that an innovative use of telecommunications technology can deliver in assisting individuals with disabilities.

Wood, D. (2009) Real life access to Second Life worlds: The potential, the problems and the possibilities for a barrier-free future, *the International Journal of Diversity in Organisations, Communities and Nations*, Vol. 8, No.6, pp.139-148



## 7.3 Web links and social media profile

Virtual Imaginings Wordpress Blog: <http://denisewood.wordpress.com/>

ALTC Profile Page: <http://www.altcexchange.edu.au/user/1505>

ALTC Blog: <http://www.altcexchange.edu.au/blog/denise-wood>

ALTC funded 3D Virtual Learning Platform Project

Website: <http://www.unisanet.unisa.edu.au/3DVLE/>

Accessible 3D Virtual Learning Environment

(YouTube): <http://www.youtube.com/watch?v=vxohlijxheS8>

## 7.4 Invited keynotes and plenary addresses

Wood, D. (2011) Maximising the affordances of new and emerging online e-learning technologies for learners with special needs, in Session 11: New Software and Technology, invited Plenary Speaker at *eLi - The 2nd International Conference of e-Learning and Distance Learning*, organised by: National Center of e-Learning and Distance Learning - The Ministry of The Higher Education in Saudi Arabia, 21-23 February 2011, Riyadh, Saudi Arabia.

Wood, D. (2010) The use of social media technologies to improve service delivery and enhance the social participation of people with disability (verbal presentation only), invited Plenary Speaker at the *National Disability Services Accommodation and Social Participation Conference, Moving On: Supporting People with Disability to Manage Change*, 7 May 2010, Gold Coast, Queensland

Wood, D. (2008) 'Virtually' inclusive Web 2.0 and 3D online communities, invited paper presented at the *Australian Rehabilitation & Assistive Technology Association Conference*, 23 September 2008, Adelaide, South Australia

## 7.5 Peer reviewed conference presentations

Fewster, R. and Wood, D. (2009) Performance pedagogy in virtual and blended learning places and spaces, *Same Places: Different Spaces. Proceedings of the 26th Annual ASCILITE Conference*, 6-9 December 2009, Auckland, New Zealand

Gregory, S., Willems, J., Wood, D., Hay, L., Ellis, A. and Jacka, L. (2011) Learning and teaching in Second Life: educator and student perspectives, in *Education 2011-2021 International Summit*, 15-18 February 2011, Sydney, NSW

Gregory, S., Gregory, B., Wood, D., Bogdanovych, A., Butler, D., Hillier, M., Jegathesan, J. J., Flintoff, K., Scutt, S., Linegar, D., Alderton, R., Stupans, I., McKeown Orwin, L., Meredith, G., McCormick, D., Collins, F., Hay, L., Grenfell, J., Stokes-Thompson, F., Cram, A., Campbell, J., Larson, I., Fluck, A., Thomas, A., Farley, H., Zagami, J., Ellis, A., Jacka, L., Neville, K., Burnett, I., Aitken, A., Simoff, S., Sinnappan, S., Muldoon, N., Pace, S., Abbas, A., Scutter, S., Wang, X., Souter, K., Ellis, D., Salomon, M., Wadley, G., Jacobson, M., and Newstead, A. (under review) How are Australian higher education institutions contributing to change through innovative teaching and learning in virtual worlds? submitted for review to *Changing Demands, Changing Directions: The 28<sup>th</sup> Annual ASCILITE Conference*, Hobart, Tasmania.

Gregory, S., Lee, M., Ellis, A., Wood, D., Hillier, M., Campbell, M., Grenfell, J., Pace, S., Farley, H., Thomas, A., Cram, A., Sinnappan, S., Smith, K., Hay, L., Kennedy-Clark, S., Warren, I., Grant, S., Craven, D. and Dreher, H. (2010) Australian higher education institutions transforming the future of teaching and learning through virtual worlds, in C.H. Steel, M.J. Keppell, P. Gerbic and S. Housego (Eds.) *Curriculum, technology & transformation for an unknown future: proceedings of the 27th Annual*



ASCILITE Conference, The University of Queensland, Brisbane, pp. 399-415

Hickey-Moody, A. and Wood, D. (2008) Imagining Otherwise: Deleuze, Disability & Second Life, in E. Tilley (Ed.) *Power and Place: refereed proceedings of Australian & New Zealand Communication Association Annual Conference*, 10 July 2008, Wellington, New Zealand

Stokes-Thompson, F., Wood, D. and Scutter, S. (under review) Facilitating the ability of graduates to articulate their employability skills through the use of a 3D virtual learning environment, submitted for review to *Changing Demands, Changing Directions: proceedings of the 28th Annual ASCILITE Conference*, Hobart, Tasmania

Wood, D. (2009) Experiential learning in 3D virtual worlds: Students making a difference to 'real' lives in 'virtual' places, *Same Places: Different Spaces, proceedings of the 26<sup>th</sup> Annual ASCILITE Conference*, 6-9 December 2009, Auckland, New Zealand

Wood, D. and Hopkins, L. (2008) 3D virtual environments: businesses are ready but are our 'digital natives' prepared for the changing landscape? *Hello! Where are you in the landscape of educational technology? Proceedings of 25<sup>th</sup> Annual ASCILITE Conference*, 20 November-3 December 2008, Deakin University, Melbourne

## 7.6 Conference papers/posters/abstracts

Bloustien, G. and Wood, D. (2009) Refractions through virtual space: photography as methodological tool and research object in 3D immersive environments, paper presented at *1st International Visual Methods Conference*, 15-17 September 2009, University of Leeds, UK

Bloustien, G. and Wood, D. (2009) 'Can I borrow your face for a minute?' Issues of aesthetics and bodily transformations in Second Life, paper presented at the *CFP - Cosmetic Cultures: Beauty, Globalisation, Politics, Practices Conference*, 24-26 June 2009, University of Leeds, UK

Bloustien, G. (2009) Does my skin look big in this? Aesthetics and bodily transformations in 3DVE for panel 'No escape from reality: S(t)imulating experiences in three dimensional virtual learning environments (3DVLE)', presented at *The Ethics and Politics of Engagement. The Australian Anthropological Society Annual Conference 2009*, 10-11 December 2009, Macquarie University, NSW

Christie, E. and Bloustien, G. (2009) 'I cyborg: or how I became a better human through machines', paper presented at *Cosmetic Cultures: Beauty, Globalisation, Politics, Practices Conferences*, 24 June 2009, University of Leeds, UK

\* Also presented at *The Ethics and Politics of Engagement: The Australian Anthropological Society Annual Conference 2009*, 10-11 December 2009, Macquarie University, NSW

Hickey-Moody, A. and Wood, D. (2009) Ethnography and the ethics of affect in virtual worlds presented at *The Ethics and Politics of Engagement: the Australian Anthropological Society Annual Conference 2009*, 10-11 December 2009, Macquarie University, NSW

Morgan, A. (2009) Using Second Life for medical understanding of hallucinatory experiences, presented at *The Ethics and Politics of Engagement: the Australian Anthropological Society Annual Conference 2009*, 10-11 December 2009, Macquarie University, NSW

Scutter, S. (2011) Teaching history taking in the virtual world, paper presented at *Australian and New Zealand Association for Health Professional Educators*, 27 June-1 July 2011, Alice Springs, NT

Seifert, J. (2009) Vandalism and terrorism in Second Life, paper presented at *The*



*Ethics and Politics of Engagement. The Australian Anthropological Society Annual Conference 2009, 10-11 December 2009, Macquarie University, NSW*

Sim, J., James, J., McDonald, M., Scutter, S. and Wood, D. (2011) The use of 3D simulation learning in healthcare disciplines: a pilot study, paper presented at *8th The Perfect Blend: Annual Scientific Meeting of Medical Imaging and Radiation Therapists 2011, 14-17 April 2011, Adelaide, SA*

Sim, J., James, J. and McDonald, M. (2010) The use of 3D simulation learning in healthcare disciplines: a pilot study, paper presented at the *2010 Learning and Teaching Forum, 26 November 2010, College of Science, Engineering and Health, Melbourne, VIC*

Wood, D. (2010) The Internet's potential to increase social networks for young Australians with disabilities, *Public Health in a 21st Century Society: New ways of knowing, doing, living, Public Health Association Australia 2010 Conference, 27-29 September 2010, Adelaide, SA*

Wood, D. (2010), Facilitating student commitment to social and ethical practice in the undergraduate curriculum, paper presented at the *International Conference on Human Rights Education, 3-4 November 2010, University of Western Sydney, NSW*

Wood, D. (2010) Increasing access and participation through an accessible open source virtual learning platform, *The Second Annual Student Equity in Higher Education Conference, 12 October 2010, Melbourne, VIC*

Wood, D. (2008) Re-engaging undergraduates through 3D virtual worlds: Innovation or reinventing the traditional? paper presented at the *Social Innovations Conference, 20 June 2008, Adelaide, SA*

Wood, D., Morris, C. and Ussery, J. (2011) Changing realities for accessibility in virtual worlds, presentation at the *26th Annual International Technology & Persons with Disabilities Conference, 14-19 March 2011, California State University Northridge, CA*

Wood, D., Morris, C. and Ussery, J. (2010) Communications in Virtual Worlds through an Accessible Web 2.0 Solution, paper presented at the *Second Life Community Convention, 13-15 August 2010, Boston, MA*

\* *The 2010 Telstra-TJA Christopher Newell Award winning accessibility solution.*

Wood, D., Morris, C. and Ussery, J. (2010) Open Source solutions for improving the accessibility of 3D virtual world environments, *Immersive Education 2010 Conference, 23-25 April 2010, Boston, MA*

Wood, D., Morris, C. and Ussery, J. (2009) Accessibility Solutions for 3D Virtual Learning Environments, peer reviewed abstract for publication in *proceedings of IEEE Accessing the Future Conference, 20-21 July 2009, Boston, MA*  
<<http://ewh.ieee.org/conf/accessingthefuture/>>

Wood, D., Ussery, J. and Morris, C. (2010) Health Care, Virtual Worlds and Education, lead panel presenter at the *Virtual Worlds Best Practice 2010 Third Annual Conference, 12-13 March 2010*

Wood, D. And Willems, J. (under review) Widening participation through 3DVLEs, poster presentation submitted for review to *Changing Demands, Changing Directions: proceedings of the 28th Annual ASCILITE Conference, Hobart, TAS*

## 7.7 Other presentations, seminars, exhibitions

Bloustien, G. (2008) Refractions through virtual space: photography as tool and symbol in 3D immersive environments, presented at *Photographies: new histories, new practices conference, 11 July 2008, Australian National University School of Art in conjunction with the 2008 VIVID National Photography Festival*





- Bloustien, G. (2008) Invited presentation: Refracting subjectivity: photography as mimetic tool and symbol in 3D immersive environments, *Sociology Departmental Seminar*, 18 July 2008, Flinders University, Adelaide, SA
- Raghavendra, P., Wood, D., Newman, L., Lawry, J. and Sellwood, D. (2009) Internet use by children and adolescents with physical disabilities: Implications for social networking, presented at the *Novita Children's Services Research Symposium*, 5 August 2009, Regency Park, SA
- Wood, D. (2011) Social Media, Keynote Speaker at *A Mine of Information: the Isolated Children's Parents Association SA State Conference*, 7 April 2011, Coober Pedy, SA
- Wood, D. (2010) Enhancing participation through social networking and virtual worlds, presentation at the Adelaide City Council *Philosopher's Cafe*, 12 November 2010, Adelaide, SA
- Wood, D. (2009) Accessibility and Social Networking Tools, invited presenter at the *Gov 2.0 Roundtable on Accessibility for People with Disabilities*, 26 November 2009, Parliament House, Canberra, ACT
- Wood, D. (2009) Avatars, Health and Education in Virtual Worlds, presented at *Broaden your communication horizons*, 17 November 2009, Healthy Development Adelaide, SA <<http://www.adelaide.edu.au/hda/news/>>
- Wood, D. (2009) Virtual Worlds, presented in *Accessibility challenges and solutions for open source 3D virtual world platforms*, AARNet training workshop, 17 September 2009, University of Wollongong, NSW
- Wood, D. (2009) Technologies of disability in virtual worlds, panellist with Hickey-Moody, A. and Goggin, G at the *Technologies of Disability Symposium*, 31 July 2009, Department of Gender and Cultural Studies, Sydney University, Sydney, NSW
- Wood, D., Morris, C. and Ussery, J. (2009) Accessibility Solutions for 3D Virtual Learning Environments, extended abstract from *IEEE Accessing the Future Conference*, 20-21 July 2009, Boston, MA
- Wood, D., Raghavendra, P. and Newman, L. (2009) Internet use by children/adolescents with physical disabilities: Implications for social networking presented at the presented at the *Novita Children's Services Research Symposium*, 5 August 2009, Regency Park, SA
- Wood, D. (2009) Ethics in screen production research, panellist at the *Australian Screen Production Research and Education Association annual conference*, 9 July 2009, Adelaide, SA
- Wood, D. (2009) Teaching in Second Life, invited speaker at the *Helen Keller event in Second Life*, 27 June 2009, <<http://www.unisa.edu.au/news/2009/250609A.asp>>
- Wood, D. (2009) Webs, Wikis, Blogs and Avatars! What the?, invited speaker at the *Association for Tertiary Education Management Central Region*, 12 August, 2009, Adelaide, SA
- Wood, D. (2008) Accessibility in 3D virtual worlds, invited presentation at the *Alliance Library Second Life Health Info Round Table*, 8 October 2008
- Wood, D. (2008) Student engagement in immersive 3D virtual learning environments: Pitfalls and promises, paper presented at the UniSA Division of Education, Arts and Social Sciences *Teaching and Learning Colloquium*, 19 November 2008, Adelaide, SA
- Wood, D. (2008) Second Life in higher education, invited presentation conducted at the *South Pacific User Services Conference*, 1 December 2008, Adelaide, SA
- Wood, D. (2008) 'Virtually' inclusive Web 2.0 and 3D online communities. invited paper presented at the *Australian Rehabilitation & Assistive Technology*



Conference, 21-24 September 2008, Adelaide, SA

Wood, D. (2008) Second Life workshop presentations at the *South Pacific User Services Conference*, 1-5 December 2008, AARNet, Adelaide, SA

Wood, D. (2008) Accessibility in 3D virtual worlds, invited presentation at the *Second Life Health conference*, 1 October 2008

## 7.8 Media releases/statements/interviews

### 7.8.1 2011

Australian Learning and Teaching Council (2011) 3D learning in South Africa, 12 July, 2011, <<http://www.altc.edu.au/July2011-south-africa>>

Esquire Technologies (2011) Esquire partners in 3D virtual learning trial, *Esquire Technologies South African website*, 25 July 2011, <<http://companies.mybroadband.co.za/esquire/2011/07/25/esquire-partners-in-3d-virtual-learning-trial/>>

*Leisure Links* (2011) Peter Greco interviews Denise Wood, 5RPH Radio, 30 July 2011 <<http://denisewood.files.wordpress.com/2011/08/rph-29072011.mp3>>

*Life Matters* (2011) radio program, ABC National, 14 June 2011 <http://www.abc.net.au/rn/lifematters/stories/2011/3240891.htm>

*Leisure Links* (2011) Interview with Peter Greco, 5RPH Radio, 26 March 2011,

*Leisure Links* (2011) Interview with Peter Greco, 5RPH Radio, 26 February 2011

Razool, F (2011) Gauteng, Limpopo teach in 3D, 18 July, 2011, *IT Web Open Source*, <[http://www.itweb.co.za/index.php?option=com\\_content&view=article&id=45444:gauteng-limpopo-teach-in-3d&catid=203](http://www.itweb.co.za/index.php?option=com_content&view=article&id=45444:gauteng-limpopo-teach-in-3d&catid=203)>

Simos, M and Pryor, L (2011) Study in another world, *Education Now*, Adelaide Advertiser, 28 June 2011, p. 61, <<http://www.adelaidenow.com.au/news/in-depth/study-in-another-world/story-e6frebv-1226083443201>>

University of South Australia (2011) Taking virtual learning to Africa. *UniSA News*, published Monday 19 August, 2011, <<http://www.unisa.edu.au/unisanews/2011/August/story10.asp>>

Varney-Wong, J (2011) Leading-edge 3D virtual learning technologies, posted on Alison Richard's blog *The Big Picture, The Fine Print*, 13 July 2011, <<http://alisonrichards.wordpress.com/2011/07/13/leading-edge-3d-virtual-learning-technologies/>>

Yusuf (2011) SANZAF, Siyafunda CTC and Esquire Technologies major role players in bringing 3d virtual learning to Gauteng, *LENZINFO: Lenasia's Very Own Website*, 7 July, 2011, <<http://www.lenzinfo.co.za/?p=2471>>

### 7.8.2 2010

Australian Communications Consumer Action Network (2010) Dr Denise Wood talks to ACCAN about Web 2.0 and 3D virtual worlds, 19 July 2010, <<http://www.accan.org.au/blog.php?category=general>>

Australian Computer Society (2010) Prestigious prize for disability and telecommunications gets 'second life', *ACS News*, May 2010 <<http://www.acs.org.au/index.cfm?action=load&temID=noticedetails&notID=1040>>

Australian Learning and Teaching Centre, (2010) ALTC announces 2010 Citation awards, Media Release, 6 July 2010, <<http://www.altc.edu.au/July2010-2010-Citation-award-winners-announced>>



Australian Learning and Teaching Council (2010), ALTC-funded research wins prestigious new award, ALTC Media Release, 24 May 2010, <<http://www.altc.edu.au/2010May-denise-woods>>

Campus Daily (2010) Citations celebrate student learning at UniSA, *Campus Daily*, 6 July 2010, <[http://www.campusdaily.com.au/read\\_university\\_news.php?id=2610](http://www.campusdaily.com.au/read_university_news.php?id=2610)>

Equal Access to Software and Information (2010) Second Life and Opportunities of a 3D Platform, webinar conducted by Professor Norman Coombs, 25 January 2010 <<http://easi.cc/clinic.htm>>

Government of South Australia (2010) Innovative community engagement program wins Premier's Award, *Minister for Volunteers Annual Report 2009-2010*, pp. 21-22, <[http://www.ofv.sa.gov.au/pdfs/MinistersReport\\_Annual\\_Report\\_2010.pdf](http://www.ofv.sa.gov.au/pdfs/MinistersReport_Annual_Report_2010.pdf)>

ImmersiveED (2010) iED 2010 Summit: University of South Australia, *University of South Australia*, 24 June 2010, <[http://www.youtube.com/watch?v=cOlfYqlxGMI&feature=player\\_embedded#!](http://www.youtube.com/watch?v=cOlfYqlxGMI&feature=player_embedded#!)>

*Leisure Links* (2010) discussion of NBN Telstra agreement and implications for broadband access for people with disabilities, interview with Peter Greco, 5RPH Radio, 26 June 2010

*Leisure Links* (2010) Interview about the Telstra-TJA Christopher Newell Award, interview with Peter Greco, 5RPH Radio, 22 May 2010

Media Access Australia (2010) Researcher receives award for using social media to support the education of people with disabilities, *Telecommunications Journal of Australia*, 20 May 2010, < <http://www.mediaaccess.org.au/node/334> >

Nardelli, M (2010) Opening Virtual Doors, *UniSA News*, 6 June 2010 <<http://www.unisa.edu.au/unisanews/2010/june/story6.asp> >

Seven Network (2010) Channel 7 Evening News interview about the benefits of social networking for people with disabilities, 3 February 2010

Sharp, K (2010) Virtual Worlds Award, *University of South Australia Magazine*, Winter 2010, p. 21, <<http://www.unisa.edu.au/news/unisamagazine/issues/2010Winter.pdf> >

Telecommunications Industry Ombudsman (2010) TIO honours former Council member, *TIO Talks*, No. 2, p. 7 <[http://www.tio.com.au/publications/TIO\\_talk\\_issues/47/TIOTalks47.pdf](http://www.tio.com.au/publications/TIO_talk_issues/47/TIOTalks47.pdf)>

Telstra (2010) Telstra prize highlights the benefits of modern communications for people with disability, Media Release, 21 May 2010, <<http://www.telstra.com.au/abouttelstra/media-centre/announcements/telstra-prize-highlights-the-benefits-of-modern-communications-for-peo-1.xml> >

Telstra (2010) When user needs drive real innovation, *Telstra Exchange*, 20 May 2010, <<http://exchange.telstra.com.au/2010/05/20/when-user-needs-drive-real-innovation/>>

University of South Australia, (2010) Citations celebrate student learning at UniSA, Media Release, 6 July 2010, <<http://www.unisa.edu.au/news/2010/060710A.asp>>

Virtual Helping Hands (2010) VHH Contribution and Collaboration is recognized in the Telstra-TJC Christopher Newell Prize, *News*, 23 May 2010, <<http://www.virtualhelpinghands.org/news.htm>>

World News Inc. (2010) 3D virtual learning platforms, *World News Network*, 28 June 2010 <[http://article.wn.com/view/2010/06/28/3D\\_virtuallearning\\_platforms/](http://article.wn.com/view/2010/06/28/3D_virtuallearning_platforms/)>



### 7.8.3 2009

APN Educational Media (2009) Real Experience in an Unreal World, *Education Review Technology Guide*, October 2009, p. v1

<<http://www.apnedmedia.com.au/email/lores-ict-sept09.pdf>>

*Breakfast with Peter Godfrey* (2009) Interview with Peter Godfrey about our research into providing accessibility solutions in 3D virtual worlds for students with disabilities, Radio Adelaide 101.5 FM, 17 August 2009

Cremorne, L (2009) Interview – Denise Wood, University of South Australia, *The Metaverse Journal*, 2 November 2009

<<http://www.metaversejournal.com/2009/11/02/interview-denise-wood-university-of-south-australia/>>

Edna.au (2009) Accessible learning in a virtual world, *Technology Update, Higher Education Update*, 25 June 2009,

<<http://www.edna.edu.au/edna/webdav/site/myjahiasite/shared/he/090625.html>>

*Leisure Links* (2009) Discussion on outcomes from the Round Table on Government 2.0, Interview with Peter Greco, 5RPH Radio 28 November 2009

*Leisure Links* (2009) Interview with Peter Greco discussing student engagement and experiential learning, 5RPH Radio, 29 August 2009, Community Webs project and Health Support Coalition student projects

<[http://www.unisanet.unisa.edu.au/3dvle/media/rph\\_ll2\\_250709.mp3](http://www.unisanet.unisa.edu.au/3dvle/media/rph_ll2_250709.mp3)>

*Leisure Links* (2009) Report on the IEEE-IBM Accessing the Future Conference, Interview with Peter Greco, 5RPH Radio, 25 July 2009

*Leisure Links* (2009) Report on the Helen Keller event in Second Life, interview with Peter Greco, RPH radio, 27 June 2009

<[http://www.unisanet.unisa.edu.au/3dvle/media/rph\\_ll1\\_270609.mp3](http://www.unisanet.unisa.edu.au/3dvle/media/rph_ll1_270609.mp3)>

Office of Senator Kate Lundy (2009) Presentation at the Gov 2.0 Roundtable at Parliament House, 26 November 2009, <<http://dotsub.com/view/0960e313-be9d-4497-ae5a-b24a7d3401a3>>

The Independent Weekly (2009) A world of opportunity, *Spectrum*, p.18,

<<http://www.indaily.com.au/?iid=28172>>

Tsigas, M (2009) Second Life for Disabled, *SBS World News Special*, 30 May 2009

### 7.8.4. 2008

Nardelli, M (2008) Breathing Life into Next Gen Learning, *UniSA News*, September 2008, University of South Australia

<<http://www.unisa.edu.au/unisanews/2008/September/mainstory.asp>>

Russel, L (2008) Virtually Real, *City Messenger* and *Eastern Courier Outlook*, May 2008

Tardos, E (2008) It's a Buyer's Market as Crunch Hits Virtual Realty, *Sun Herald*, 28 December 2008, <<http://www.smh.com.au/news/national/its-a-buyers-market-as-crunch-hits-virtual-realty/2008/12/27/1229998789864.html>>

## 7.9 Publications in progress

Kivunja, C. and Wood, D. (accepted for 2011) Multigrade pedagogy and practice: Accelerating Millennium Development Goals for Sub-Saharan Africa, abstract submitted for presentation at the *Eighteenth International Conference on Learning*, 5-8 July 2011, Mauritius.

Wood, D. and Rapotu, R. (under review) Addressing millennium development goals



(MDGs) through the use of accessible information and communication technologies (ICTs) in South African schools, paper submitted for presentation at the *8<sup>th</sup> World Assembly of the Disabled Peoples' International*, 10-13 October 2011, Durban

Gerry Bloustien is also preparing a paper for her edited collection *a Framed: screen representations of otherness and refracted subjectivity*. Negotiations for publication are underway with two potential British publishers: Palgrave-Macmillan and BFI.

Denise Wood is negotiating with a publisher regarding a proposed edited collection of chapters for a book titled *Designing Accessible Virtual Worlds*.





## 8 Linkages

### 8.1 Links with other projects/fellowships in ALTC priority areas

Albion, P and McKeown, L. (2010) The seamless integration of Web3D technologies with university curricula to engage the changing student cohort, *University of Southern Queensland with the Australian Learning and Teaching Council*, Strawberry Hills, NSW <<http://www.altc.edu.au/resource-integration-web3d-university-curricula-usq-2010> >

Gregory, S., Masters, Y., Dalgarno, B., Dreher, H., Campbell, M., Reiners, T., Crisp, G. and Knox, V (2010) VirtualPREX: innovative assessment using a 3D virtual world with pre-service teachers, *the Australian Learning and Teaching Council*, <<http://www.altc.edu.au/resource-integration-web3d-university-curricula-usq-2010> >

### 8.2 Disciplinary and interdisciplinary linkages

- The University of Sheffield (partner institution in the UK) contributed case studies and contributed to the development of guidelines. • The University of Sheffield (partner institution in the UK) contributed case studies and contributed to the development of guidelines. Professor Jackie Marsh also hosted two guest seminars at Sheffield for visitors from the 3DVLE network: the first on 16 July 2009, the second on 4 May 2010.
- Easy Access to Software and Information Inc (US) have contributed to guidelines on the design of accessible e-learning platforms.
- Virtual Ability Inc (US) assisted in the recruitment of people with disabilities who undertook testing of the platform.
- Virtual Helping Hands Inc (US) assisted in the recruitment of people with disabilities who undertook testing of the platform. They have also collaborated on the development of accessible features incorporated into the platform.
- Sharon Collingwood, Ohio State University, contributed to guidelines regarding access and equity.
- The National Center for e-Learning, Riyadh, Saudi Arabia, is in the process of planning to conduct a survey of ICT use in 27 universities, with the view to identify ways in which Web 2.0 and 3DVLEs can be used to enhance learning outcomes, with a particular focus on women Muslim students.
- Gauteng and Limpopo Provinces in South Africa are collaborating on adapting the platform to suit the South African context.
- Limpopo Economic Development Authority in South Africa has contributed funding to extend the work to South Africa.
- South African National Zakah Foundation contributed funding to extend the work to South Africa.
- The University of Makerere, Uganda, is collaborating on the potential application of the platform to support multigrade pedagogy in remote regions of South Africa.
- Preliminary discussions are underway with the University of Limpopo regarding potential of the 3DVLE for use in undergraduate education and for their students to undertake placements in South African schools in which the 3DVLE has been implemented.



## 9 Evaluation

Ethics approval was obtained for the evaluations of student and teacher experiences using *Second Life* in the courses included in the 10 case studies (UniSA Human Research Ethics committee, Tuesday, 5 February 2008 and the teacher survey was approved by UniSA Human Research Ethics Committee in January 2011).

The Mixed-Methods Approach adopted for the evaluation of this project has involved several stages as:

Stage one: Trials of 10 courses across three different 3D virtual worlds:

- 1) *Second Life*
- 2) *ReactionGrid*
- 3) *OpenSim* (running on a dedicated UniSA server).

Stage two: Student evaluations of their experiences. The methods employed for evaluating student experiences varied from one institution to another depending on their preferred approach and ethics requirements. UniSA students undertaking five different courses in *Second Life* completed an anonymous online survey instrument, which can be viewed online.

Stage three: The coordinators of each of the courses were asked to prepare a written case study reporting on the aims or components of a course that were conducted in the 3D virtual world, the desired learning outcomes, the outcomes from the trial of the course, their student experiences and their own reflections. These case studies can be viewed online via the case study section of the project site.

Stage four: An online survey was conducted involving 32 teachers from Australian and international higher education institutions who identified as having taught courses in 3D virtual worlds. The teachers were recruited via the Australian Virtual Worlds Working Group (AVWWG) and various 3D virtual world related listservs. The online survey instrument is available for download.

Stage five: Five hypothetical scenarios were developed around the main areas of interest, including:

- i) students undertaking research in 3D virtual worlds
- ii) probity
- iii) student behaviour
- iv) equity
- v) Intellectual Property.

These scenarios were distributed to approximately 10 experts from each thematic area, inviting them to comment on how they would respond to one or two issues raised by the scenarios.

Stage six: Draft guidelines for teaching and learning in 3D virtual worlds were developed, informed by the case studies, the findings from the teacher survey and the responses to the hypothetical scenarios.

Stage seven: People with disabilities and leaders from support groups providing services to people with disabilities were invited to respond to an invitation. This was to apply for paid consultant positions to undertake a review of draft accessibility guidelines and to evaluate the two components of the open source accessibility solution (an open source accessible 3D virtual world viewer and a Web 2.0 presenter interface for those unable to attend classes in the virtual world). To carry out the evaluation, 15 people with disabilities were contracted. The evaluation form completed by the consultants is available for download.

Stage eight: An independent evaluation of the technical adequacy of the open



source accessibility solution, and its compliance with W3C Web Content Accessibility Guidelines, was conducted by Dr Scott Hollier, Project Manager, Media Access Australia. This independent evaluation was undertaken both formatively and summatively.

Stage nine: An anonymous online survey instrument using *Survey Monkey* has been created, focusing on the adequacy and usefulness of the draft guidelines. Project team members, reference group members and members of the AVWWG will be invited to provide feedback on the guidelines. The guidelines will be progressively refined and updated via the website based on the ongoing feedback received. The link to this online survey instrument will be provided shortly to enable stake holders to review and contribute to the published guidelines.

Stage ten: Independent summative evaluation of the project including achievement of aims and objectives, deliverables and the project overall was conducted by Professor Ron Oliver.

## 9.1 Formative review

As reported by Wood [79] the findings from preliminary testing undertaken by Scott Hollier [80] from *Media Access Australia* of the Web 2.0 interface based on the WCAG 2.0 principles are shown in Table four below. The first column specifies the relevant WCAG 2.0 guideline, the second column details the outcome of the testing of each feature against the associated WCAG 2.0 guideline and the third column indicates our proposed solution to identified issues that need to be addressed.

**Table 4:** Results of initial independent accessibility testing of the Web 2.0 interface to the 3DVLE

3C WCAG 2.0	Web 2.0 interface	Implications for design
<b>Principle 1: Perceivable</b>		
1.1 Provide text alternatives for any non-text content so that it can be changed into other forms people need, such as large print, Braille, speech, symbols or simpler language.	The project effectively complies with this guideline. For images which include words, the site converts these to text, which is then inserted into the chat window.	No changes required.
1.2 Provide alternatives for time-based media.	The website features a refreshed image in the top-right corner which is designed to provide the user with a view of what's happening in <i>Second Life</i> , updated close to real time. Currently there is no alternative for this content.	We are implementing a solution that minimises the frequency at which the image is refreshed. This provides a means for dynamically updating the caption when the image changes.
1.3 Create content that can be presented in different ways (e.g. simpler layout) without losing information or structure.	This guideline is effectively implemented. The delivery of visual content as text ensures compliance with this guideline, and other web-based information. This includes the use of relative font sizes and the ability to change colour schemes without any accessibility issues. This demonstrates the effectiveness of this guideline.	No changes required.
1.4 Make it easier for users to see and hear content including separating foreground	While the content in <i>Second Life</i> is effectively displayed visually, and some effort has gone into improving the accessible content through the use of WAI-	We have now changed the icon to a more intuitive audio player interface with appropriate



from background.	ARIA, there are some accessibility issues in relation to the delivery of real time audio information from the <i>Second Life</i> environment. Firstly, the module requires the installation of QuickTime, and currently there is no alert to inform the user if this module is not installed. Secondly, the audio text and icon is not intuitive to the user.	text description. We are also implementing an automatic detection to determine if QuickTime is installed, and to prompt the user to download and install it if this is required.
<b>Principle 2: Operable</b>		
2.1 Make all functionality available from a keyboard.	The brief testing of the site suggested that the keyboard navigation of the site has not been implemented.	While the controls are accessible via keyboard, we have taken heed of the recommendation to also provide enhanced keyboard navigation, such as short-cut keys, skip links and logical tab order.
2.2 Provide users enough time to read and use content.	The site endeavours to address this issue by maintaining the chat window text for a period of time before fading out.	We have implemented an option that enables the user to display the full chat log on demand.
2.3 Do not design content in a way that is known to cause seizures.	Although some images refresh regularly, there does not appear to be any content that could cause seizures.	No changes required.
2.4 Provide ways to help users navigate, find content, and determine where they are.	The site has several sections displayed on the one page. Given that there are a number of elements, it would be helpful to improve the labelling of each element on the page so that users are clear about what information is being provided in each section, and how each section interacts with the others.	These changes are being implemented.
<b>Principle 3: Understandable</b>		
3.1 Make text content readable and understandable.	The written text on the site is primarily user-generated and as such it is difficult to assess this guideline.	No changes required.
3.2 Make web pages appear and operate in predictable ways.	The somewhat unique nature of this site means that the website does not currently operate in predictable ways.	This will be reviewed as the site is developed further. Additional labels and help options may address this issue.
3.3 Help users avoid and correct mistakes.	Currently there is little information to guide a user on how to use the site. Additional labelling and explanatory documentation will help address this issue.	These changes are being implemented.
<b>Principle 4: Robust</b>		
4.1 Maximize compatibility with current and future user agents, including assistive technologies.	The implementation of WAI-ARIA and other technologies ensures that the website is likely to remain current and compatible with future agents.	No changes required.



## 9.2 Summative review

### 9.2.1 Testing of the Web 2.0 Interface, Chat and Slide Show Presenter:

This section is a summary of the above principles listed in table 4 regarding the web 2.0 interface, the chat and the slide show presenter.

#### [1] Perceivable

*[1.1] Provide text alternatives for any non-text content so that it can be changed into other forms people need, such as large print, Braille, speech, symbols or simpler language.*

Alternative text was present in all elements. The use of ARIA landmarks added additional functionality to ensure that all elements were correctly labelled, and the presentation slides used for testing appeared to contain alternative text that could be accessed by the NVDA screen reader. All tests suggest that the website is compliant, based on the use of accessible slides.

*[1.2] Provide alternatives for time-based media.*

There does not appear to be any time-based media present in the presenter portal.

*[1.3] Create content that can be presented in different ways (e.g. simpler layout) without losing information or structure.*

This guideline is effectively implemented. The slide presentations are effectively translated for the use of a screen reader, and other links and resources have the ability to adjust the text and interface size.

*[1.4] Make it easier for users to see and hear content including separating foreground from background.*

This guideline depends largely on the type of slide presentations used in the presentation. In its basic format, the contrast levels are effective. However, if a poorly contrasting slide presentation is used, this may be a factor. All content viewed during testing complied with this guideline.

#### [2] Operable

*[2.1] Make all functionality available from a keyboard.*

Using the TAB key, arrows, short keys specific to the application and assistive technology, the keystrokes provided effective functionality to all elements of the presenter portal, and the use of ARIA landmarks provided additional functionality.

*[2.2] Provide users enough time to read and use content.*

The only concern is that the chat window may have responses scroll off before a user has had a chance to access all the content, but this has been addressed through the 'message log' link. This alternative results in the website being compliant.

*[2.3] Do not design content in a way that is known to cause seizures.*

Although some slide images may refresh regularly, there does not appear to be any content that could cause seizures.

*[2.4] Provide ways to help users navigate, find content, and determine where they are.*

The website's effective keyboard navigation, along with additional keyboard commands and the presence of a 'help' function provides sufficient help to users.

#### [3] Understandable





*[3.1] Make text content readable and understandable.*

While it is possible that the real time chat content has the potential to affect this requirement, the text present on the portal such as the menus is clear and understandable.

*[3.2] Make Web pages appear and operate in predictable ways.*

Although the portal is largely intuitive, it may take new users some time to get fully acquainted with how the project works.

*[3.3] Help users avoid and correct mistakes.*

The presence of the 'help' function and the clearly labelled menus make it a clear and straightforward process to interact with the portal, making it likely that users will be able to avoid mistakes. The only issue is that it may be difficult for users to correct an accidental post in the chat window.

#### **[4] Robust**

*[4.1] Maximize compatibility with current and future user agents, including assistive technologies.*

The use of ARIA and standards-compliant code suggests that this website is compliant with this guide.

### **9.2.2 Testing of the *AccessGlobe* Viewer**

The *AccessGlobe* software and the *MaxVoice* text-to-speech engine provided a significant amount of voice feedback for people who are blind or vision impaired. The feedback was effective in relation to general navigation, accessing chat functions, navigating through the inventory list and other *Second Life* functions.

Outside of the comment set of an individual's avatar, the combination of the software programs was also effective in alerting the user to the presence of other avatars and providing important information. *AccessGlobe* also provided a wealth of features to toggle various environmental variables which can make the environment easier to process. However, the sheer wealth of features means that there would be some learning required to take full advantage of the benefits.

Other benefits of the *AccessGlobe* interface included the useful help function and the ability for *MaxVoice* to read out all alerts. If a vision impaired person is using a screen magnification program, it is easy to miss the alert, and the voice prompt can be very useful in drawing the focus of the user to a message that needs urgent attention.

Although the interface was generally accessible, and had a vast improvement over the standard *Second Life* viewer, there were some issues in its installation and the fact that it asks for a First Name and Last Name login instead of the standard username. These are minor issues though and in a setting where *Second Life* is used for educational purposes, such issues could be quickly addressed, enabling the blind or vision impaired user to effectively navigate the *Second Life* environment.

### **9.2.3 Conclusion**

The current portal is effective in providing an accessible interface for people who are blind or vision impaired in viewing slides displayed in *Second Life*. The menus are well labelled, the ARIA landmarks provide effective navigation, alternatives are provided and the 'help' option provides good support to users.



While the portal is accessible as it stands, it is recommended that accessibility advice be given to people presenting through the portal as inaccessible slides will render elements of the portal inaccessible as well.

The *AccessGlobe* with *MaxVoice* interface for *Second Life* provides a significant amount of audio feedback in terms of accessing personal avatar features, understanding the interaction of other avatars and providing additional abilities through the search and help functions. Assistance is recommended for the initial setup of the software. After setup, the accessibility features should provide great benefits to people who are blind or vision impaired.

### 9.3 Evaluation by users with disabilities and expert developers—accessibility solutions

Current users of 3DVLEs were recruited to paid consultancy positions through a note card distributed by Virtual Helping Hands Inc, a not-for-profit organisation in *Second Life* which provides support for people with disabilities and from participants in the ethnographic study. These participants had indicated interest in contributing to the evaluation of the open source 3DVLE and development of guidelines for improving the accessibility of classes conducted in 3DVLEs.

15 individuals responded to the note card invitation including 13 who have disabilities (visual impairment [including one who is blind] and mobility impairment) and three who are experts in 3DVLE development, but did not identify as having a disability in their actual lives. Of those who responded to the invitation, 11 signed contracts and completed their reviews, including eight with disabilities and three expert developers. One only participated in contribution to the questions relating to strategies to improve the accessibility of sessions/classes conducted in 3DVLEs and did not test the two open source solutions developed for the project. Thus, 10 users (four with visual impairments; three with mobility impairments and three expert developers who did not identify as having a disability) undertook the testing of the *AccessGlobe* viewer and Web 2.0 interface. All but one of these reviewers reported that they were experienced users of virtual worlds such as *Second Life* and *OpenSim*.

Users were required to test both the *AccessGlobe* viewer as well as the Web 2.0 interface, which was developed to enable users who could not access the 3DVLE to still participate through an accessible Web 2.0 site. After testing both of these solutions, respondents were asked to complete a series of rating scale questions relating to the accessibility of the features in each of the solutions. Their responses are reported in the following section.

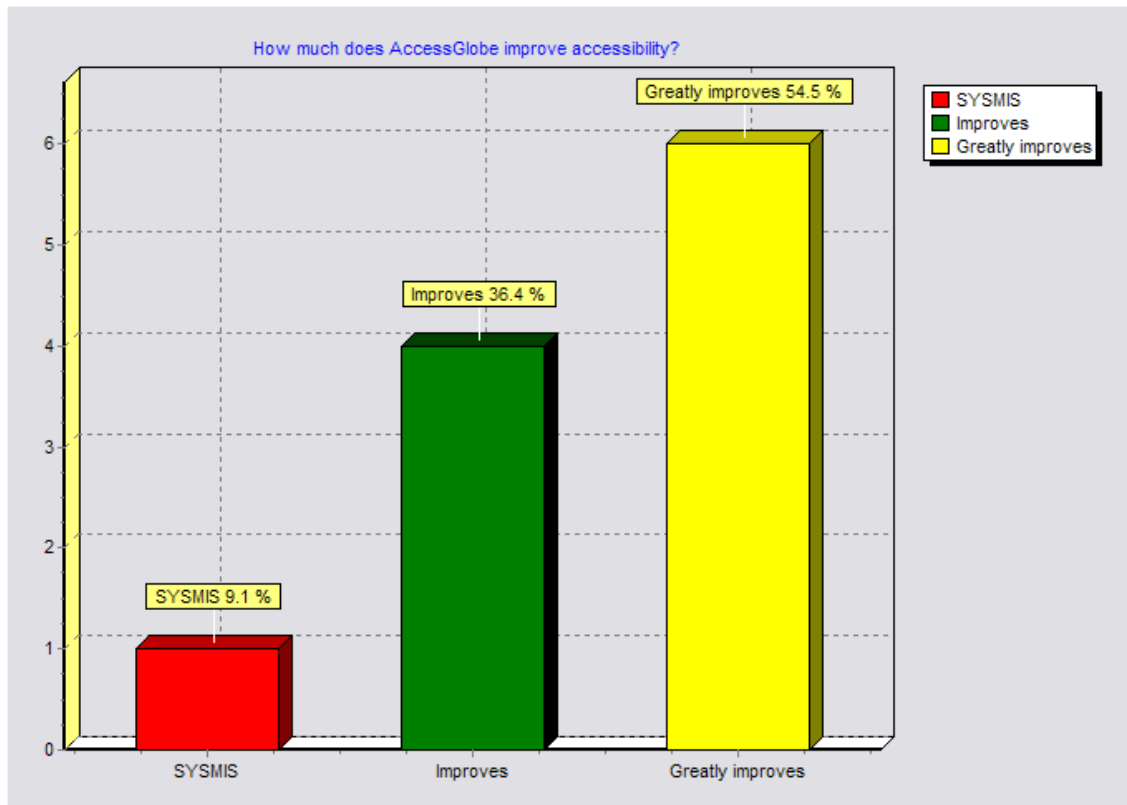
#### 9.3.1 Accessibility of the *AccessGlobe* viewer

As Table 5 and Figure 19 show, all users who responded to this question reported that the open source viewer developed for the project either greatly improves (54.5 per cent) or improves (36.4 per cent) the accessibility of the 3DVLE experience.

**Table 5:** How much does *AccessGlobe* improve accessibility?

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
3 Improves	4	36.4	40.0	40.0
4 Greatly improves	6	54.5	60.0	100.0
Total	10	90.9	100.0	
Total	11	100.0		





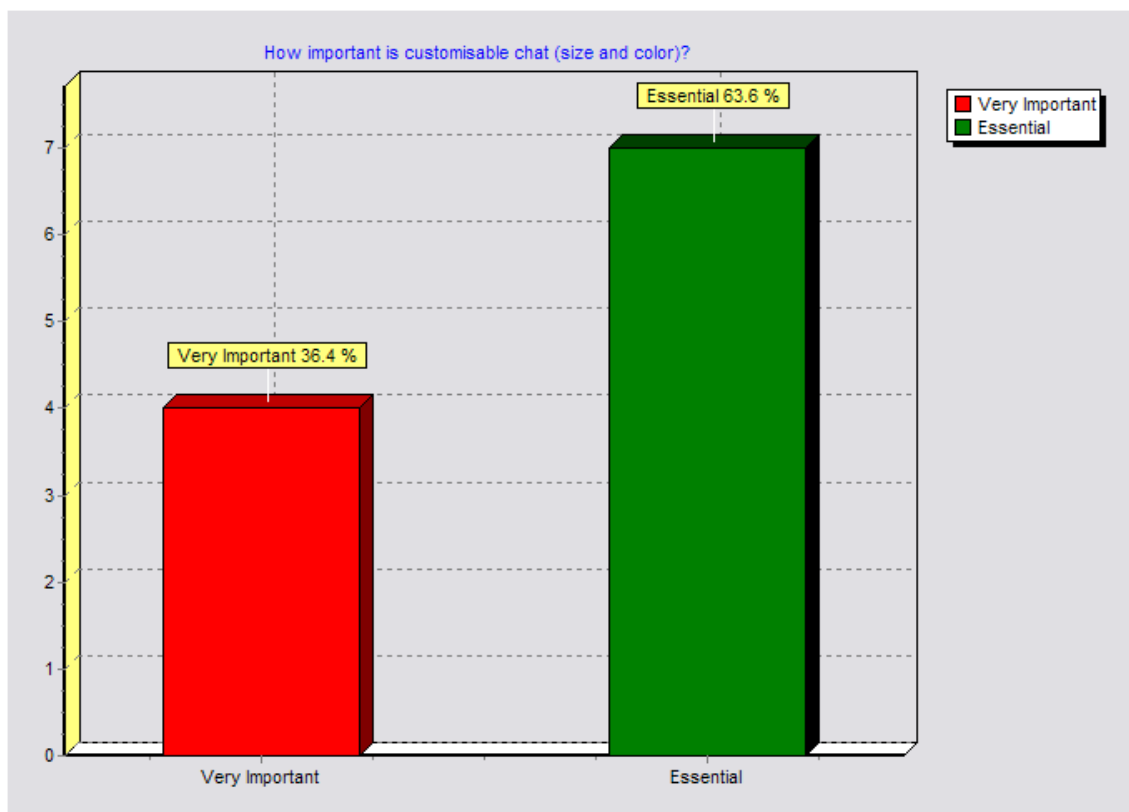
**Figure 19:** User evaluation of the accessibility of the *AccessGlobe* viewer

As Table 6 and Figure 20 show, all users also agreed that the customisable text chat (both size of text and colour) in the *AccessGlobe* viewer is either an essential 4(36.4 per cent) or very important 7(63.6 per cent).

**Table 6:** How important is the customisable text chat (size and colour)?

	Frequency	Percent	Valid Percentage	Cumulative Percentage
4 Very Important	4	36.4	36.4	36.4
5 Essential	7	63.6	63.6	100.0
Total	11	100.0	100.0	





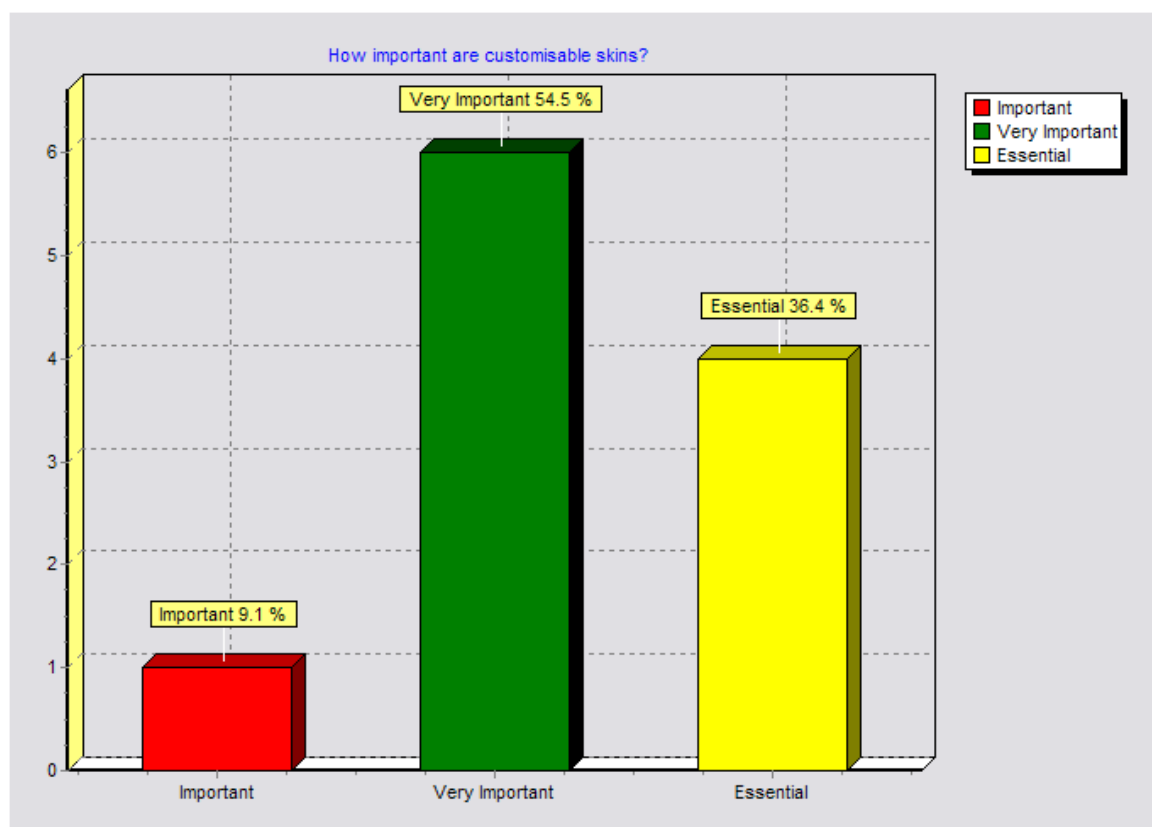
**Figure 20:** User evaluation of the customisable text feature of *AccessGlobe* viewer

Similarly, as Table 7 and Figure 21 illustrate, all users agreed that the customisable interface “skin” in the *AccessGlobe* viewer is essential 4(36.4 per cent), very important 6 (54.5 per cent) or important 1(9.1 per cent).

**Table 7:** How important are the customisable skins?

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
2 Important	1	9.1	9.1	9.1
4 Very Important	6	54.5	54.5	63.6
5 Essential	4	36.4	36.4	100.0
Total	11	100.0	100.0	





**Figure 21:** User evaluation of the customisable skins in the *AccessGlobe* viewer

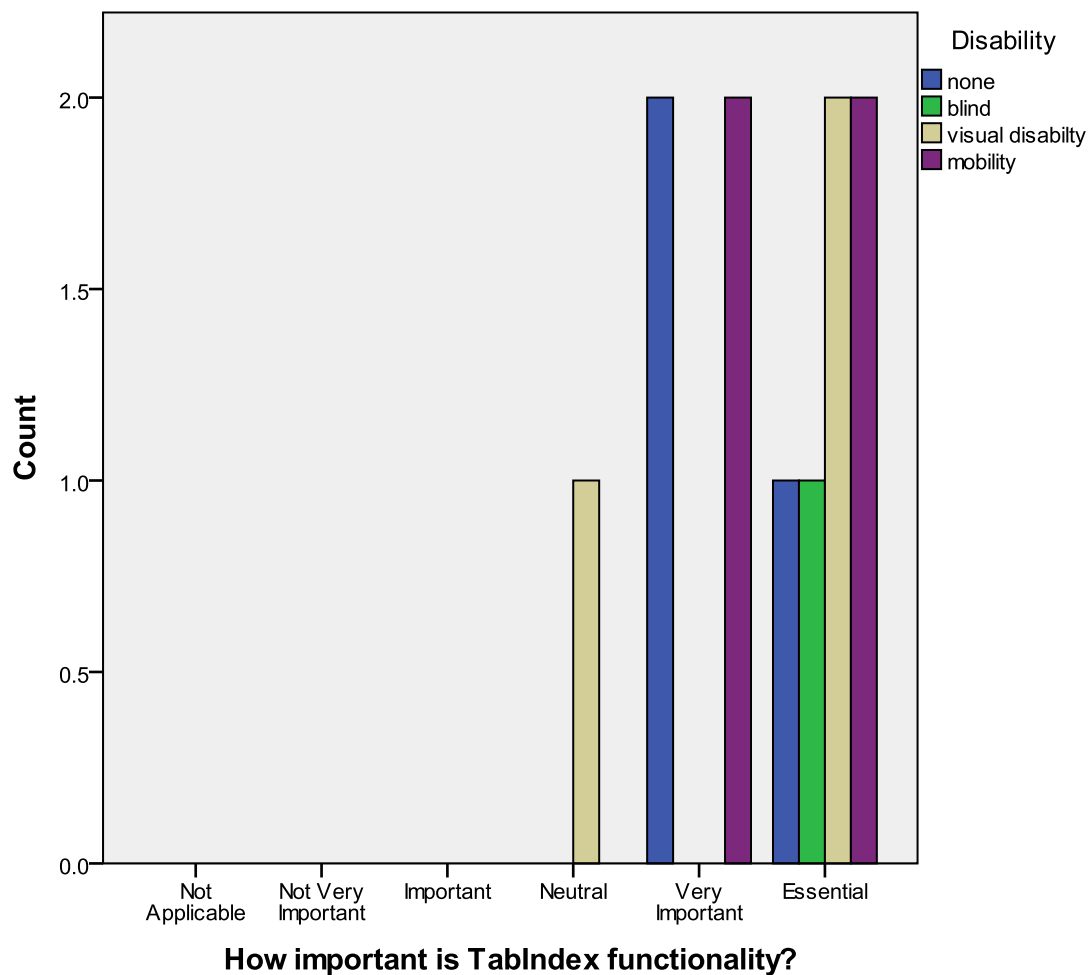
The *AccessGlobe* viewer also includes tab-index functionality, which is no longer available in the version two *Second Life* viewer. Users were asked to rate the importance of this accessibility feature. As Table 8 and Figure 22 show, six of users (54.5 per cent) regarded this feature to be essential, four (36.4 per cent) regarded it as very important and one (9.1 per cent) user with a visual impairment responded as neutral. This is perhaps not surprising since the tab-index functionality is most likely to benefit users who are blind and those with mobility impairments who rely on keyboard access rather than the mouse pointing device.

**Table 8:** How important is the tab-index functionality?

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
3 Neutral	1	9.1	9.1	9.1
4 Very Important	4	36.4	36.4	45.5
5 Essential	6	54.5	54.5	100.0
Total	11	100.0	100.0	







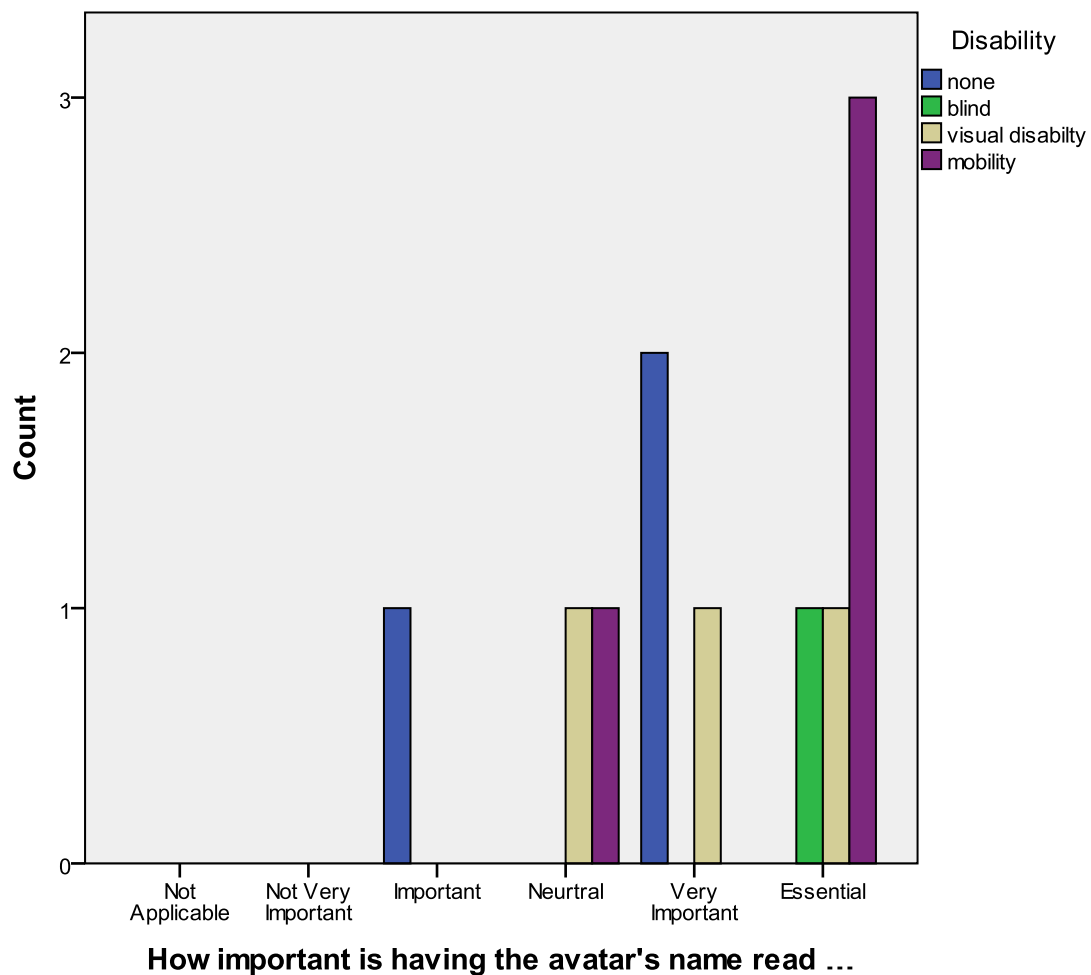
**Figure 22:** User evaluation of the tab-index functionality in the *AccessGlobe* viewer according to disability type

The accessibility features developed through this project and incorporated into the *AccessGlobe* viewer have been designed to complement *MaxVoice* technology developed by Virtual Helping Hands Inc. This feature is designed to alert users who are blind or visually impaired of other avatars in their vicinity. Users were asked to comment on the importance of this feature. As Table 9 and Figure 23 show, the majority of users (five respondents or 45.5 per cent) regarded the feature as essential, three (27.3 per cent) suggested the feature is very important, two (9.1 per cent) stated it is an important feature, while two (18.2 per cent) responded with neutral. Not surprisingly, the one blind user reported this to be an essential feature for accessibility.

**Table 9:** How important is it to have the name of the avatar read aloud using MaxVoice technology developed by Virtual Helping Hands Inc?

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
2 Important	1	9.1	9.1	9.1
3 Neutral	2	18.2	18.2	27.3
4 Very Important	3	27.3	27.3	54.5
5 Essential	5	45.5	45.5	100.0
Total	11	100.0	100.0	





**Figure 23:** User evaluation of the importance of the *MaxVoice* accessibility feature enabling the name of the avatar to be read aloud

### 9.3.2 Accessibility of Web 2.0 interface to the 3DVLE

The second component of the accessibility solution developed through this project involved the design and development of a Web 2.0 interface to the virtual world. This was to enable users who could not access the virtual world due to bandwidth limitations, hardware limitations or disability, to still participate in synchronous classes conducted 'in-world' via a website.

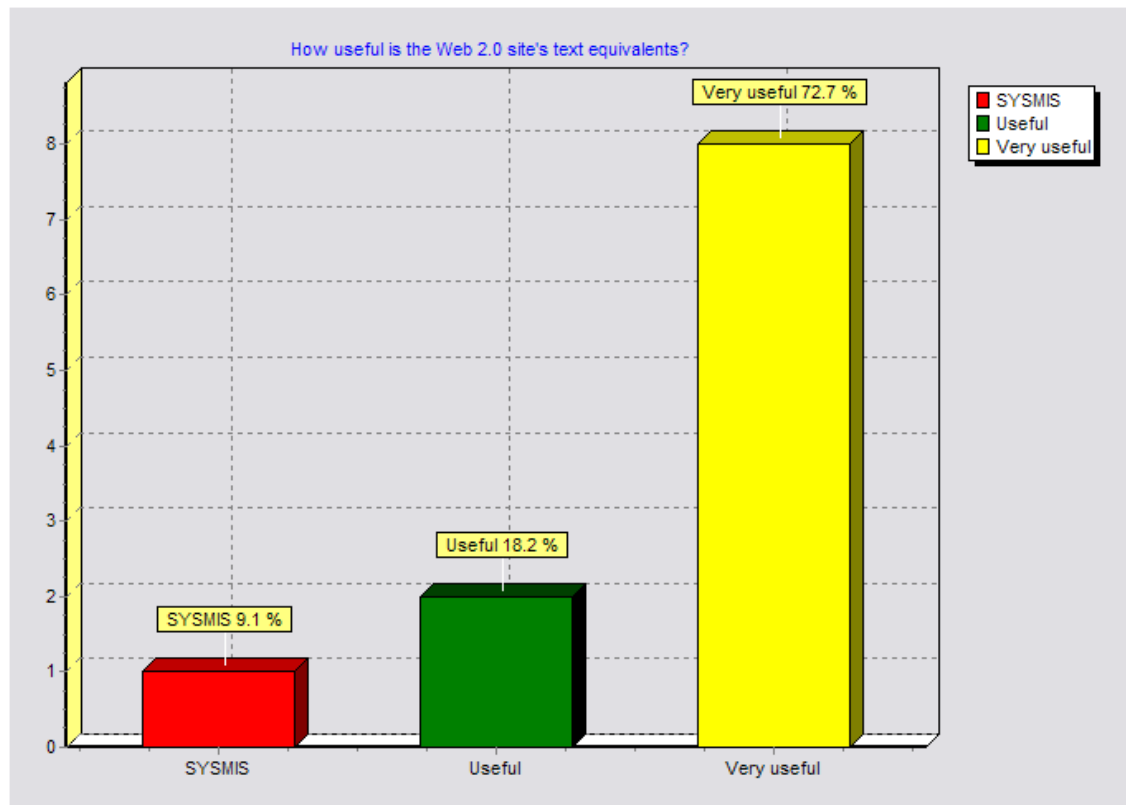
Users were asked to review the various accessibility features of this solution and the findings are reported in the following sections.

*Usefulness of the Web 2.0 site's ability to provide text equivalents for images displayed from 'in-world'.* As Table 10 and Figure 24 show, eight users (72.7 per cent) regarded this functionality to be very useful and two (18.2 per cent) regarded the function to be useful (with one missing response).



**Table 10:** How useful are the text equivalents for visual content?

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
3 Useful	2	18.2	20.0	20.0
4 Very useful	8	72.7	80.0	100.0
Total	10	90.9	100.0	
Total	11	100.0		

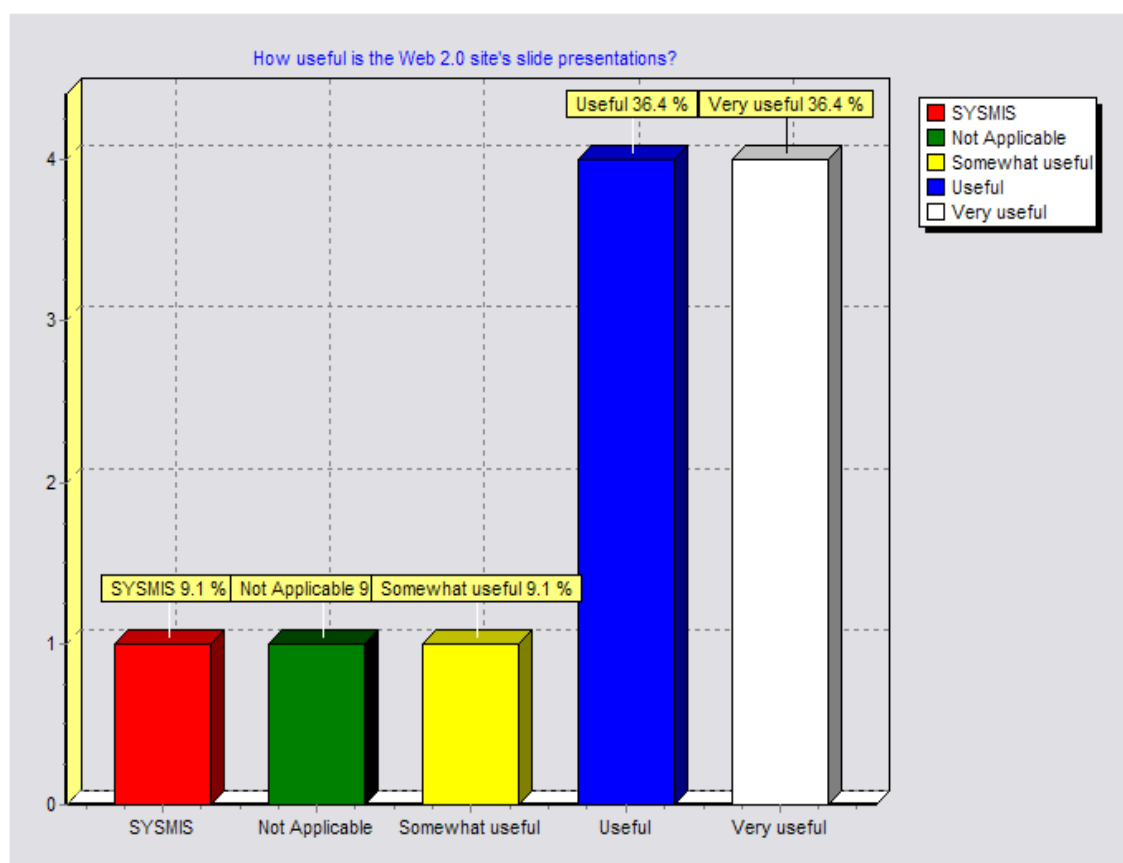
**Figure 24:** How useful are the text equivalents for visual content?

*Usefulness of the slide presentations presented 'in-world' being shown synchronously via the Web 2.0 site.* As shown in Table 11 and Figure 25, users were divided in their views about the usefulness of this feature, with four (36.4 per cent) regarding it to be very useful, four (36.4 per cent) stating that it is useful and one (9.1 per cent) reporting it to be somewhat useful. One user, who is blind, stated that the feature is not applicable; not a surprising finding since only users who could see the slide show images would benefit from this feature.

**Table 11:** How useful is it to have slides presented 'in-world' also streamed to the website?

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
0 Not Applicable	1	9.1	10.0	10.0
2 Somewhat useful	1	9.1	10.0	20.0
3 Useful	4	36.4	40.0	60.0
4 Very useful	4	36.4	40.0	100.0
Total	10	90.9	100.0	
Total	11	100.0		





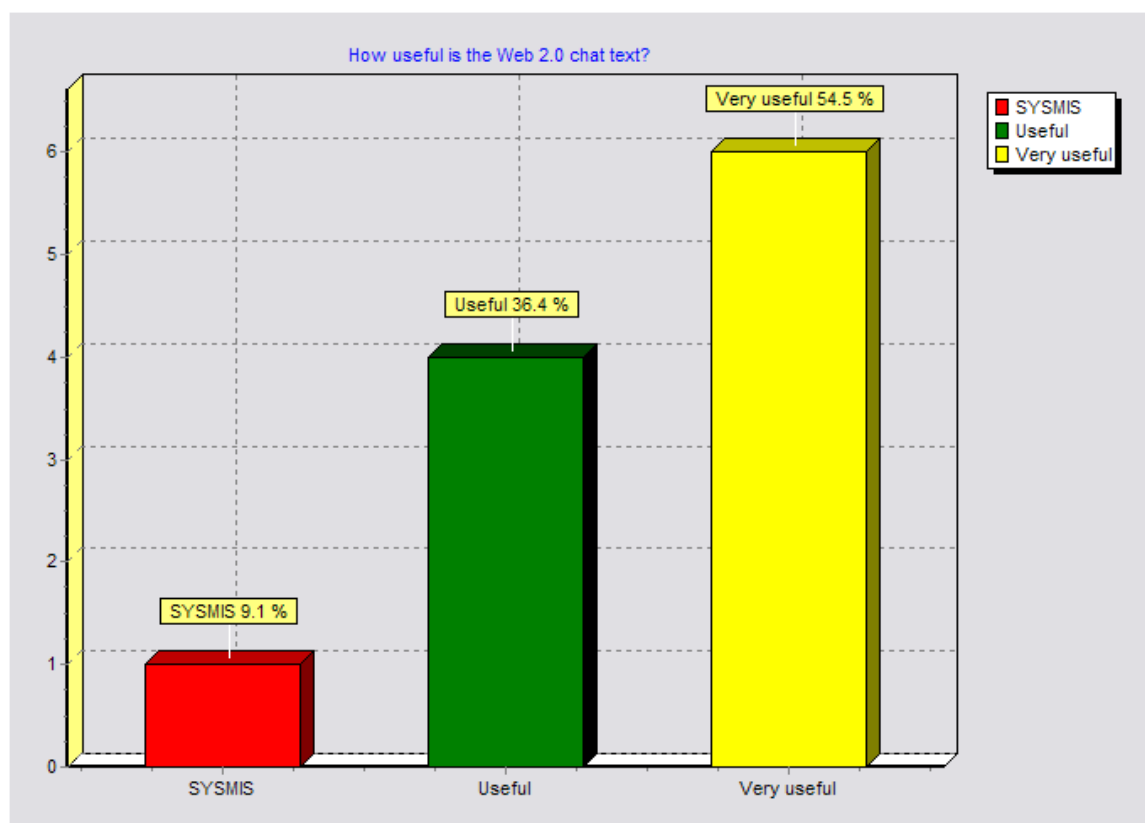
**Figure 25:** How useful is it to have slides presented 'in-world' streamed to the website?

*Usefulness of the text chat from "in-world" sessions being streamed synchronously via the Web 2.0 site.* Table 12 and Figure 26 show that six (54.5 per cent) regarded this feature to be very useful, with four (36.4 per cent) regarding the feature to be useful.

**Table 12:** How useful is it to have text chat 'in-world' also streamed to the website?

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
3 Useful	4	36.4	40.0	40.0
4 Very useful	6	54.5	60.0	100.0
Total	10	90.9	100.0	
Total	11	100.0		





**Figure 26:** How useful is it to have text chat presented 'in-world' streamed to the website?

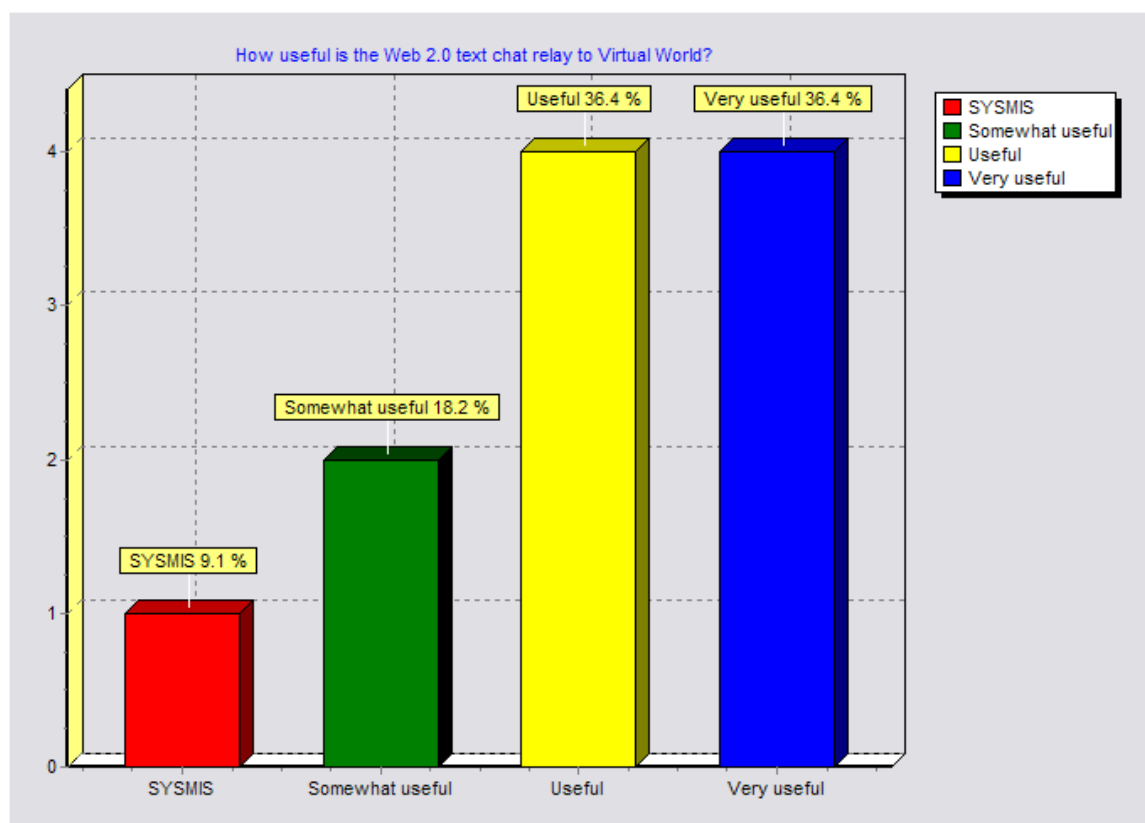
*Usefulness of the text chat relay being streamed into 'in-world' sessions via the Web 2.0 site.* Table 13 and Figure 27 show that four users (36.4 per cent) regarded this feature to be very useful, four (36.4 per cent) rated it as useful, two (18.2 per cent) reported this feature to be somewhat useful.

**Table 13:** How useful is it to have text chat from the Web 2.0 site streamed into 'in-world' sessions?

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
2 Somewhat useful	2	18.2	20.0	20.0
3 Useful	4	36.4	40.0	60.0
4 Very useful	4	36.4	40.0	100.0
Total	10	90.9	100.0	
Total	11	100.0		







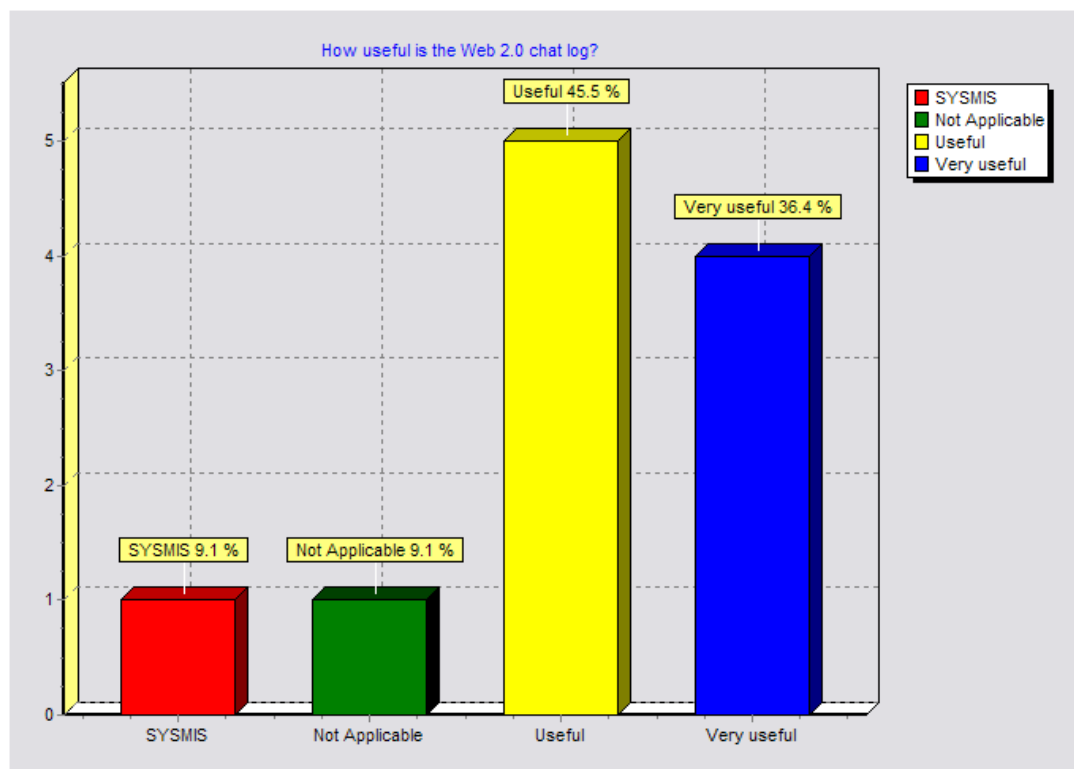
**Figure 27:** How useful is it to have text chat from the Web 2.0 site streamed into 'in-world' sessions?

*Usefulness of the text chat log presented via the Web 2.0 site.* This feature was incorporated to accommodate screen reader users who are unable to scroll back to the text chat history. As shown in Table 14 and Figure 28, four users (36.4 per cent) regarded this feature to be very useful, five (45.4 per cent) regarded it to be useful and one (9.1 per cent) stated the feature is not applicable to them.

**Table 14:** How useful is the chat log presented via the Web 2.0 site?

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
0 Not Applicable	1	9.1	10.0	10.0
3 Useful	5	45.5	50.0	60.0
4 Very useful	4	36.4	40.0	100.0
Total	10	90.9	100.0	
Total	11	100.0		





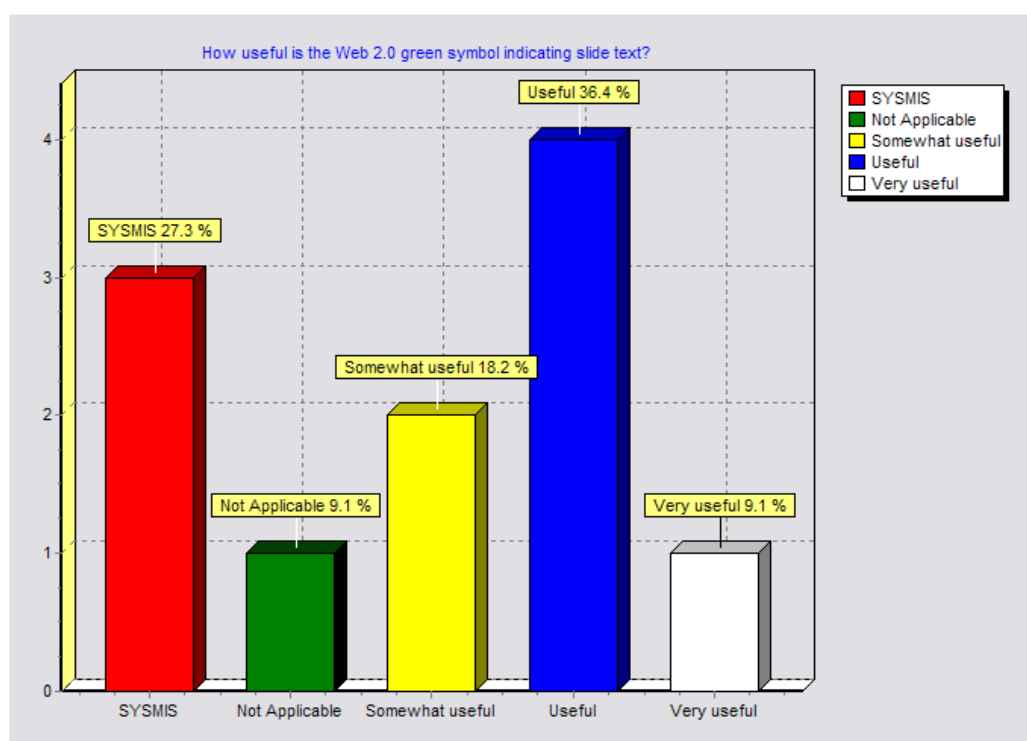
**Figure 28:** How useful is the chat log presented via the Web 2.0 site?

*Usefulness of the use of a green symbol displayed in the real time text chat presented via the Web 2.0 site to indicate slide show test.* This feature was incorporated to enable users who access the virtual world via the Web 2.0 site to be able to differentiate between text chat streaming from text discussions 'in-world' and text equivalents from the slide show presentation. These are also displayed in the same chat window. The responses shown in Table 15 and Figure 29 suggest that users were mixed in their views about the usefulness of this feature. One user (9.1 per cent) regarded this to be a very useful feature, four (36.4 per cent) stated it was useful, two (18.2 per cent) indicated it is somewhat useful with one (9.1 per cent) stating it was not applicable. This is not surprising, since the one person who reported the feature to be not applicable is blind and could not see the symbol displayed on the website.



**Table 15:** How useful is the Web 2.0 green symbol indicating slide text?

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
0 Not Applicable	1	9.1	12.5	12.5
2 Somewhat useful	2	18.2	25.0	37.5
3 Useful	4	36.4	50.0	87.5
4 Very useful	1	9.1	12.5	100.0
Total	8	72.7	100.0	
System	3	27.3		
Total	11	100.0		



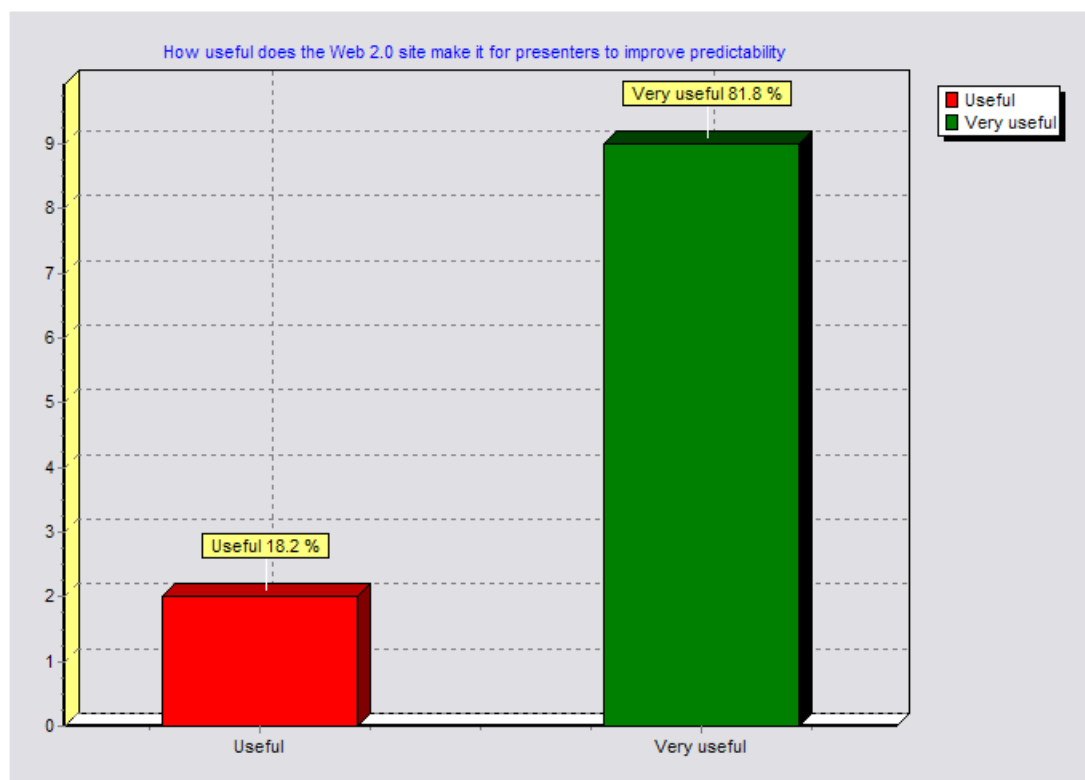
**Figure 29:** How useful is the Web 2.0 green symbol indicating slide text?

*How useful does the Web 2.0 site make it for presenters to improve predictability?*  
 People with disabilities often experience difficulties in understanding content and being able to predict the manner how the site they are interacting with behaves. Users were asked to rate the usefulness of the Web 2.0 site in helping users to predict the behaviour of their interactions with the site. As Table 16 and Figure 30 show, all users agreed that the site does improve the ability for presenters to improve predictability of interactions in classes/sessions, with nine (81.8 per cent) stating this feature is very useful and two (18.2 per cent) indicating the feature is useful.



**Table 16:** How useful does the Web 2.0 site make it for presenters to improve predictability?

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
3 Useful	2	18.2	18.2	18.2
4 Very useful	9	81.8	81.8	100.0
Total	11	100.0	100.0	



**Figure 30:** How useful does the Web 2.0 site make it for presenters to be able to improve predictability?

### 9.3.3 Overview of independent evaluations of accessibility solution

Independent reviews conducted by Media Access Australia and users (including eight users with disabilities) suggest the *AccessGlobe* viewer, in conjunction with *MaxVoice* technology developed by Virtual Helping Hands Inc, significantly improves the accessibility of user experiences in 3DVLEs such as *Second Life*. The audio feedback provided 'in-world' enables users with visual impairments to interact with text chat and other objects effectively. The customisable features such as text, size, colour and the incorporation of customisable skins accommodates users with visual impairments who are not reliant on screen readers. The tab-index functionality was found by users with mobility and vision impairments to be an important accessibility feature.

Similarly both the independent reviewer from Media Access Australia and the users were generally positive about the features of the Web 2.0 site in increasing accessibility for people with disabilities, and those unable to access the virtual world. In particular, the independent evaluator noted that the current portal is effective in providing an accessible interface for people who are blind or vision impaired in



viewing slides displayed 'in-world' as, 'the menus are well labelled, the ARIA landmarks provide effective navigation, alternatives are provided and the 'help' option provides good support to users.'

Users and the independent evaluator emphasised the importance of providing embedded help functions 'in-world' and via the Web 2.0 site. While help is currently available via the Web 2.0 site, and to a certain extent is also built into the interface of *AccessGlobe*, as the independent evaluator suggested, people with disabilities are still likely to need initial assistance. This is to ensure they understand how to set up and use the accessibility features built into *AccessGlobe* and the Web 2.0 interface. One user with a visual impairment also suggested that an 'in-world' landing place that provides training materials and orientation features would be valuable.

Other features identified by users who reviewed *AccessGlobe* and the Web 2.0 interface as useful additions include:

- provision of voice-to-text functionality
- enhanced accessibility built into mobile viewers for iPad and iPhone devices
- descriptive content for audio and video materials
- the ability to stop the built-in voice narrating content
- the provision of an accessibility items folder 'in-world'
- provision of keyboard access to the top menu with access key support.

It should be noted that no users who identified as being deaf volunteered to participate in the review of *AccessGlobe* and the Web 2.0 interface. They would likely have noted the current lack of voice-to-text features built into *AccessGlobe*. However, some users report some success using *Dragon Naturally Speaking* for text input, and further research is required to explore the potential of this kind of technology in improving access for users who are unable to participate in sessions conducted in voice only. At present, the guidelines presented in an earlier section of this report, which advise educators to conduct sessions in voice and text, are the best solution for ensuring that students with hearing impairments are not excluded from such sessions conducted 'in-world'.

## **9.4 Summative evaluation conducted by Professor Ron Oliver (Edith Cowan University, August 2011)**

An independent external evaluation was undertaken by Professor Ron Oliver from Edith Cowan University, to provide an impartial assessment of the success of the project. The evaluation report comprised four discrete sections, each of which explores and describes the findings and outcomes in relation to the project goals of:

1. exploring contemporary usage of 3DVLEs through case studies of curriculum innovations and interviews and surveys of teachers, students and other stakeholders
2. developing an accessible 3D viewer
3. developing guidelines for teachers to enable the effective use of virtual environments in higher education
4. disseminating the outcomes and deliverables to facilitate and increase use of the 3D learning environments in the sector.





Professor Oliver's final evaluation report concluded:

It is clear that I formed a very positive view about the success of this project in achieving its goals. The project objectives were primarily to:

- design and develop an accessible, open-source 3DVLE as a generic pedagogical tool for flexible, experiential and community-based disciplinary and cross-disciplinary learning in simulated environments
- develop source code based on the same open source standards as popular 3DVLEs such as *Second Life*
- ensure the 3DVLE developed using open source standards will integrate a range of accessibility features that are currently not supported by 3D virtual environments
- provide a range of accessible open source 3DVLE tools enabling academics to adapt real life approaches to the creation of interactive activities designed to maximise learner engagement
- develop guidelines to address pedagogy, accessibility and legal, ethical and intellectual property (IP) responsibilities, as well as case studies of best practice across disciplines to guide academics in designing environments that facilitate learner engagement and experiential learning
- release the deliverables from the proposed project to the ALTC community, allowing universities access to the benefits of 3DVLEs.

It is clear that these objectives have been met, and the 3D viewer *AccessGlobe* seems destined to assist many institutions and learners to gain access to the learning opportunities afforded by 3DVLEs. Through formal testing the 3D viewer has been shown to provide the functionality and capabilities sought and the product has won national acclaim for the Project Leader. The guidelines and case studies have been completed and published as intended.

The project has employed sound dissemination strategies throughout its lifecycle and has demonstrated a wide range of activities that have brought this work to public attention, all of which have raised awareness of the outcomes and deliverables. Given the scope and quality of the outcomes, and the growing level of interest across the world in the subject of this project, I have suggested that further publication of the work should be considered. I urge the Project Team to consider these suggestions which will bring further recognition for the outcomes which are clearly high quality and much needed.



## 10 References

- Abrahams, P. (2007) Second Life open source accessible client, *Abrahams Accessibility*, retrieved 18 August 2008 < [http://www.it-director.com/blogs/Abrahams\\_Accessibility/2007/1/second\\_life\\_open\\_source\\_accessible.html](http://www.it-director.com/blogs/Abrahams_Accessibility/2007/1/second_life_open_source_accessible.html) >
- Asia Pacific Forum on Educational Integrity (APFEI) (2010) What is educational integrity?, retrieved (DATE) <<http://apfei.edu.au/about/educational-integrity.html> >
- Bakioğlu, B. S. (2007) Collaborative story-telling: Performing the narrative of the griever, in D. Livingstone and J. Kemp (Eds.) *Proceedings of the Second Life Education Workshop Community Convention*, pp. 41-46, The University of Paisley, UK
- Balkin, J. M. (2004) Virtual liberty: Freedom to design and freedom to play in virtual worlds, *Virginia Law Review*, Vol. 90, No.8, pp. 2043-2098
- Berners-Lee applies Web 2.0 to improve accessibility (2006) OUT-LAW.COM, retrieved 13 December 2008, < <http://www.out-law.com/page-6946> >
- Bloomfield, R. (2008) Reactions to the Rosedale announcement [blog posting on March 14 2008], *Thomas Reuters Second Life News Center*, retrieved 19 June 2008 <<http://secondlife.reuters.com/stories/2008/03/14/instant-view-reactions-to-the-roosedale-announcement/>>
- Bloomfield, R. (2007) Worlds for study: Invitation-virtual worlds for studying real-world business (and law, and politics, and sociology, and....) retrieved 9 June 2011, <[http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=988984](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=988984)>
- Boellstorff, T. (2009) *Coming of age in Second Life: An anthropologist explores the virtually human*, Princeton University Press, New Jersey, USA
- Bradley, D., Noonan, P., Nugent, H., and Scales, B. (2008) Review of Australian higher education: Final report, retrieved 19 June 2011, <[http://www.deewr.gov.au/HigherEducation/Review/Documents/PDF/Higher%20Education%20Review\\_one%20document\\_02.pdf](http://www.deewr.gov.au/HigherEducation/Review/Documents/PDF/Higher%20Education%20Review_one%20document_02.pdf) >
- Bretag, T., Mahmud, S., East, J., Green, M., James, C., McGowan, U., Partridge, L., Walker, R. and Wallace, M. (2011, forthcoming) Academic integrity standards: A preliminary analysis of the academic integrity policies at Australian universities, paper accepted for the refereed stream of the *Australian Universities Quality Forum*, 29 June-1 July 2011, Melbourne, Australia < [http://www.apfei.edu.au/sites/default/files/documents/altc/Bretag\\_et\\_al\\_Analysing\\_policy\\_AUQF\\_1\\_July\\_2011-1.pdf](http://www.apfei.edu.au/sites/default/files/documents/altc/Bretag_et_al_Analysing_policy_AUQF_1_July_2011-1.pdf) >
- Buchanan, E. (2011) Internet research ethics: Past, present, and future, in M. Consalvo and C. Ess (eds.) *The Handbook of Internet Studies*, Wiley-Blackwell, pp.83-108.
- Carlson, S. (2005). The net generation goes to college. *The Chronicle of Higher Education*, 52. Retrieved 22 March 2009, from <<http://chronicle.com/free/v52/i07/07a03401.htm>>
- Carter, B. and Click, A. (2006) Imagine the Real in the Virtual: Experience your Second Life, from the 22<sup>nd</sup> *Annual Conference on Distance Teaching and Learning*, The Board of Regents of the University of Wisconsin System, Madison, USA, <[http://www.uwex.edu/disted/conference/Resource\\_library/proceedings/06\\_4202.pdf](http://www.uwex.edu/disted/conference/Resource_library/proceedings/06_4202.pdf) >
- Cheal, C. (2007) Second Life: hype or hyperlearning?, *On the Horizon*, Vol. 15, No. 4, pp. 204-210, doi: 10.1108/10748120710836228
- Michael, D. and Chen, S. (2005) Serious games: Games that educate, train, and



- inform, retrieved 31 October 2010,  
<[http://www.gamasutra.com/view/feature/2443/book\\_excerpt\\_serious\\_games.php](http://www.gamasutra.com/view/feature/2443/book_excerpt_serious_games.php)>
- Chesney, T., Coyne, I., Logan, B., and Madden, N. (2009) Griefing in virtual worlds: causes, casualties and coping strategies. *Information Systems Journal*, Vol. 19, No. 6, pp. 525-548.
- Clark, S., and Maher, M. L. (2003) The effects of a sense of place on the learning experience in a 3D virtual world, in Cook, J. and McConnell, D. (Eds) *Communities of Practice Research: Research Proceedings of the 10th Association for Learning Technologies Conference (ALT-C2003)*, University of Sheffield, UK, pp. 82-101
- Coates, J., Suzor, N., and Fitzgerald, A. (2007) Legal Aspects of Web 2.0: Management of legal risk associated with use of YouTube, MySpace and Second Life, Queensland University of Technology and ARC Centre of Excellence for Creative Industries and Innovation
- Cooper, T. (2007) Nutrition Game In D. Livingstone and J. Kemp (Eds.), *Proceedings of the Second Life Education Workshop Community Convention*, pp. 47-50, the University of Paisley, UK
- Creagh, T., Nelson, K., and Clarke, J. (2011) Acknowledging social justice and equity through good practice for monitoring student learning engagement in FYE, paper presented at the *14th Pacific Rim First Year in Higher Education Conference*, 28 June – 1 July 2011, Freemantle, WA
- de Zwart, M. (2007) Second Life spawns new world of law, *Monash Magazine*, Monash University, VIC, retrieved 10 March 2008,  
<<http://www.monash.edu.au/pubs/monmag/issue19-2007/opinion/opinion-second-life.html>>
- Dickey, M. (2005) Brave new (interactive) worlds: A review of the design affordances and constraints of two 3D virtual worlds as interactive learning environments, *Interactive Learning Environments*, Vol. 13, No. 1-2, pp. 121-137
- Dougherty, C. (2007) Virtual Worlds: Bragg v. Linden: Virtual property rights litigation *E-Commerce Law & Policy*, Vol. 9, No. 7
- Dudley, A., Braman, J., Wang, Y., Vincenti, G., & Tupper, D. (2010) Security, legal, and ethical implications of using virtual worlds, paper presented at the *14th World Multi-Conference on Systemics, Cybernetics and Informatics: WMSCI 2010*, Orlando, Florida, USA
- East, J. (2009) Aligning policy and practice: An approach to integrating academic integrity, *Journal of Academic Language and Learning*, Vol. 3, No. 1, A38-A51  
<<http://journal.aall.org.au/index.php/jall/article/view/66/62>>
- Elliott, A. (2010) Equity, pedagogy and inclusion. Harnessing digital technologies to support students from low socio-economic backgrounds in higher education, *Community Informatics: A Global d-Journal*, Vol. 6, No. 3, <<http://ci-journal.net/index.php/ciej/article/view/751/643>>
- Ess, C. and the AoIR Ethics Working Committee (2002) Ethical decision-making and Internet research: Recommendations from the AoIR ethics working committee, approved by AoIR, 27 November 2002, <<http://www.aoir.org/reports/ethics.pdf>>
- Dejavu, J (2010) E.V.A. voice chat advancement system, retrieved 14 June 2011, <<http://jarek-dejavu.shop1.cz/menu/products/e-v-a-voicechat-advancement-1-32>>
- Fruchterman, J. (2007) Benetech: technology meets society: Brighton Beach brainstorm, retrieved 14 June 2008,  
<<http://benetech.blogspot.com/2007/11/brighton-beach-brainstorm.html>>
- GimpGirl Community (n.d) GimpGirl Community Chat Room, retrieved 14 June 2011, <<http://www.gimpgirl.com/mod/resource/view.php?id=31>>



- Google (n.d.) Google™ accessibility. retrieved 14 June 2011, <<http://www.google.com/accessibility/>>
- Gray, K., Thompson, C., Clerehan, R., Sheard, J. and Hamilton, M. (2008) Web 2.0 authorship: Issues of referencing and citation for academic integrity, *The Internet and Higher Education*, Vol. 11, No. 2, pp. 112-118
- Gregory, S., Lee, M., Ellis, A., Gregory, B., Wood, D., Hillier, M., Campbell, M., Grenfell, J., Pace, S., Farley, H., Thomas, A., Cram, A., Sinnappan, S., Smith, K., Hay, L., Kennedy-Clark, S., Warren, I., Grant, S., Craven, D. and Dreher, H. (2010) Australian higher education institutions transforming the future of teaching and learning through virtual worlds, *Proceedings of the 26th Annual ASCILITE Conference: Curriculum, technology and transformation for an unknown future*, Sydney, NSW
- Grimes, J. M., Fleischman, K. R. and Jaeger, P. T. (2009) Virtual guinea pigs: Ethical implications of human subjects research in virtual worlds, *International Journal of Internet Research Ethics*, Vol. 2, No. 1, pp. 38-56 <[http://ijire.net/issue\\_2.1/grimes.pdf](http://ijire.net/issue_2.1/grimes.pdf)>
- Hancock, V. (2010) Essential, desirable or optional? Making distance e-learning courses available to those without internet access, *European Journal of Open, Distance and E-Learning*, Vol. 2010, No. 1, retrieved 28 September 2010, <<http://www.eurodl.org/?article=411>>
- Hansen, S. (2008) Virtual worlds: Synopsis of user interfaces and accessibility initiatives, paper presented at *the AusWeb08: The Fourteenth Australasian World Wide Web Conference*, 5-9 April 2008, Ballina, NSW <<http://ausweb.scu.edu.au/aw08/papers/refereed/hansen2/paper.html> >
- Hayes, E. (2006) Situated learning in virtual worlds: The learning ecology of Second Life, *AERC Conference Proceedings*, retrieved 14 June 2008, <<http://www.adulterc.org/Proceedings/2006/Proceedings/Hayes.pdf>>
- Hendaoui, A. (2008). 3D Social Virtual Worlds: Research Issues and Challenges. *Internet Computing*, IEEE, 12(1), 88-92.
- Henderson, M., Huang, H., Grant, S. & Henderson, L. (2009). Language acquisition in Second Life: Improving self-efficacy beliefs. In Same places, different spaces. *Proceedings ASCILITE Auckland 2009*. <<http://www.ascilite.org.au/conferences/auckland09/procs/henderson.pdf>>
- Hickey-Moody, A. and Wood, D. (2008) Imagining Otherwise: Deleuze, Disability & Second Life, in E. Tilley (Ed.) *Power and Place: refereed proceedings of Australian & New Zealand Communication Association Annual Conference*, 10 July 2008, Wellington, New Zealand
- Hollier, S. (2010) Website accessibility overview: Second Life accessible web interface, Media Access Australia, Ultimo, NSW.
- Humphreys, S. (2005) Productive users, intellectual property and governance: the challenges of computer games, *Media and Arts Law Review*, Vol. 10, No.4, pp. 299-310
- Israel, M. and Hay, I. (2006) Research ethics for social scientists, *Sage Publications*, London, Thousand Oaks, CA and New Dehli
- Kennedy, G., Dalgarno, B., Gray, K., Judd, T., Waycott, J., Bennett, S., Maton, K., Krause, K., Bishop, A., Chang, R. and Churchward, A. (2007) The net generation are not big users of Web 2.0 technologies: Preliminary findings from a large cross-institutional study, In *Providing choices for learners and learning. Proceedings ASCILITE Singapore 2007*, pp. 517-525 <<http://www.ascilite.org.au/conferences/singapore07/procs/kennedy.pdf>>





- James, R., Bexley, E., Anderson, M., Devlin, M., Garnett, R., Marginso, S. and Maxwell, L. (2008) A review of the participation in higher education of people from low socioeconomic backgrounds and Indigenous people, The University of Melbourne, VIC <<http://www.deakin.edu.au/dro/view/DU:30006777>>
- Kucharski, P. (2007) The facts of (Second) Life: your rights in the virtual world, Arts Law Centre of Australia, Woolloomooloo, NSW  
<<http://www.artslaw.com.au/articles/entry/the-facts-of-second-life-your-rights-in-the-virtual-world/>>
- Kelle, S., and Garcia, R. (2007) Usability and accessibility in Web 3D,  
<<https://gradient.it.uc3m.es/file-storage/view/publications%5C/uess07-rcq.pdf>>
- Lee, J. J., & Christopher, M. H. (2006). Ugly in a world where you can choose to be beautiful: teaching and learning about diversity via virtual worlds *Proceedings of the 7th international conference on Learning sciences*. Bloomington, Indiana: International Society of the Learning Sciences.
- Lee, J. and Hoadley, C. (2006) Ugly in a world where you can choose to be beautiful: teaching and learning about diversity via virtual worlds. *Proceedings of the 7th international conference on Learning Sciences*, Indiana University, Bloomington
- Lee, C. and Warren, M. (2007) Security issues within virtual worlds such as Second Life, in C. Valli and A. Woodward (Eds.), *Proceedings of the 5th Australian Information Security Management*, Edith Cowan University, Western Australia, pp. 142-151
- Linden Research Inc. (2009) Libretto Viewer, retrieved 14 June 2011  
<[http://wiki.secondlife.com/wiki/Third\\_Party\\_Viewer\\_Directory/Libretto](http://wiki.secondlife.com/wiki/Third_Party_Viewer_Directory/Libretto)>
- Lombardi, J., and McCahill, M. (2004) Enabling social dimensions of learning through a persistent, unified, massively multi-user, and self-organizing virtual environment, in *Proceedings Second International Conference on Creating, Connecting and Collaborating through Computing*, IEEE Computer Society Washington, USA, pp.166-172
- Mason, H. (2007) Experiential education in Second Life, in D. Livingstone and J. Kemp (Eds.) *Proceedings of the Second Life Education Workshop Community Convention*, Vol. 2007, The University of Paisley, UK, pp. 14-18
- Mason, R. and Rennie, F. (2008) E-Learning and Social Networking Handbook: Resources for Higher Education, Routledge, New York, USA
- McKee, H. and Porter, J. (2009a) Ethics of internet research: A rhetorical case-based process (Digital Formations), Peter Lang Publishing, New York, USA
- McKee, H. and Porter, J. (2009b) Playing a good game: Ethical issues in researching MMOGs and virtual worlds, *International Journal of Internet Research Ethics*, Vol. 2, No.1, pp.5-37 <[http://ijire.net/issue\\_2.1/mckee.pdf](http://ijire.net/issue_2.1/mckee.pdf)>
- Memorial University (2011) Policies, guidelines and waiver form, Retrieved 17 June 2011 <[http://www.distance.mun.ca/secondlife/Policies\\_Waiver\\_Guidelines.pdf](http://www.distance.mun.ca/secondlife/Policies_Waiver_Guidelines.pdf)>
- Mili, F., Barr, J., Harris, M., and Pittiglio, L. (2008). Nursing training: 3D game with learning objectives, *Proceedings of the 2008 First International Conference: Advances in Computer-Human Interaction*, pp. 236-242.
- Mistral, P. (2007a) *Alphaville Herald*: Interview with Woodbury University's Edward Clift, retrieved 10 June 2008 <<http://alphavilleherald.com/2007/07/interview-with-5.html>>
- Mistral, P. (2007b) *Alphaville Herald*: Woodbury University island destroyed, Retrieved 10 June 2008 <<http://alphavilleherald.com/2007/07/woodbury-univer.html>>





- Mulholland, C. (2008) cited in We must get to grips with the world of our 'digital native' students. (2008, 24 January, 2008). Western Mail, p. 26.
- Norman, D. (1999) Affordance, conventions and design, *Interactions*, Vol. 6, No. 3, pp. 38-43
- Oblinger, D., and Oblinger, J. (2005) Educating the Net Generation, *Educause*, retrieved 14 June 2011, <<http://www.educause.edu/books/educatingthenetgen/5989>>
- Penfold, P. (2008) SL hotel and tourism student feedback, retrieved 14 June 2011, <<http://www.scribd.com/doc/4612817/SL-Hotel-and-Tourism-Student-Feedback?autodownload=pdf>>
- Peters, T., and Bell, L. (2007) Reading in the dark - Accessibility and democracy in Second Life, retrieved 22 March 2009 <<http://kestrell.livejournal.com/343509.html>>
- Polvinen, E. (2007) Educational simulations in Second Life for fashion technology students, in D. Livingstone and J. Kemp (Eds.), *Proceedings of the Second Life Education Workshop Community Convention*, The University of Paisley, UK, pp. 61-64
- Prensky, M. (2009) H. Sapiens digital: From digital immigrants and digital natives to digital wisdom, *Innovate*, Vol. 5, No. 3 <[http://innovateonline.info/pdf/vol5\\_issue3/H.\\_Sapiens\\_Digital-From\\_Digital\\_Immigrants\\_and\\_Digital\\_Natives\\_to\\_Digital\\_Wisdom.pdf](http://innovateonline.info/pdf/vol5_issue3/H._Sapiens_Digital-From_Digital_Immigrants_and_Digital_Natives_to_Digital_Wisdom.pdf)>
- Prensky, M. (2001) Digital natives, digital immigrants, *On the Horizon*, Vol. 9, No. 5, pp. 1-6
- Rhino Moon Captioning (n.d) Project readon. Access for All™, retrieved 14 January 2011, <<http://www.projectreadon.com/>>
- Qi, S. (2007) Experts debate how accessible virtual worlds are to the disabled, retrieved January 14 2010 <<http://www.slnn.com/index.php?SCREEN=article&about=accessibility-in-a-3d-world>>
- Linden Research Inc. (2009) *Radegast*, retrieved 14 June 2011, <[http://wiki.secondlife.com/wiki/Third\\_Party\\_Viewer\\_Directory/Radegast](http://wiki.secondlife.com/wiki/Third_Party_Viewer_Directory/Radegast)>
- Ramirez, B. (2009) A space odyssey: The implications of moving the writing center into the virtual world, paper presented at *4th Asia Pacific Conference on Educational Integrity (4APCEI)*, 28-30 September 2009, University of Wollongong, NSW
- Reynolds, R. and de Zwart, M. (2010) The duty To 'play': Ethics, EULAs and MMOs, *International Journal of Internet Research Ethics*, Vol. 3, No. 1, pp. 48-68 <[http://ijire.net/issue\\_3.1/5\\_Reynolds\\_deZwart.pdf](http://ijire.net/issue_3.1/5_Reynolds_deZwart.pdf)>
- Robbins, S. (2007) A futurist's view of Second Life education: A developing taxonomy of digital spaces, in D. Livingstone and J. Kemp (Eds.), *Proceedings of the Second Life Education Workshop Community Convention*, Vol. 2007, The University of Paisley, UK, pp. 27-33
- Rosenberg, A. (2010) Virtual world research ethics and the private/public distinction, *International Journal of Internet Research Ethics*, Vol. 3, No. 1, pp. 23-37
- Rouvrais, S. and Gilliot, J. (2004) A pedagogical canvas for on-line simulation-based lessons, In L. Cantoni and C. McLoughlin (Eds.), *Proceedings of World Conference on Educational Multimedia, Hypermedia and Telecommunications 2004*, Lugano, Switzerland, pp. 3727-3732
- Linden Research Inc (n.d.) *Second Life®*, retrieved 31 October 2010, <<http://secondlife.com/>>
- Sigthorsson, G. (2005) Copy/paste: The joys of plagiarism, *M/C Journal: a Journal of Media and Culture*. Vol. 8, No. 3, <<http://journal.media-culture.org.au/0507/04->



[sigthorsson.php](#) >

Software Secure (2011) The Secureexam® Remote Proctor System, retrieved 17 June 2011, <<http://www.softwaresecure.com/US/solution/secureexam-remote-proctor.aspx>>

Thiessen, P. and Russell, E. (2009) WAI-ARIA live regions and channels: ReefChat as a case example, *Disability and Rehabilitation: Assistive Technology*, Vol. 4, No. 4, pp. 276-287

Tolich, M. (2004) Internal confidentiality: When confidentiality assurances fail relational informants, *Qualitative Sociology*, Vol. 27, No. 1, pp. 101-106, doi: 10.1023/B:QUAS.0000015546.20441.4a

Virtual Ability Inc, retrieved 14 June 2011, < <http://virtualability.org/>>

Virtual Helping Hands (2009) Virtual Guide Dog Project. retrieved 14 June 2011, <<http://www.virtualguidedog.com/>>

W3C World Wide Web Consortium, (2009) WAI-ARIA Overview, retrieved 14 January 2011, < <http://www.w3.org/WAI/intro/aria.php>>

W3C World Wide Web Consortium (2008) Web Content Accessibility Guidelines 2.0 (WCAG 2.0), retrieved 14 January 2011, < <http://www.w3.org/TR/WCAG20>>

Warren, I. and Palmer, D. (2010) Crime risks of three-dimensional virtual environments, retrieved 1 January 2011, <<http://www.aic.gov.au/publications/current%20series/tandi/381-400/tandi388/view%20paper.aspx>>

Warren, I., Palmer, D., King, T. and Segrave, S. (2008) Second Life and the role of educators as regulators, paper presented at *Hello! Where are you in the landscape of educational technology? Proceedings of 25<sup>th</sup> Annual ASCILITE Conference*, 20 November-3 December 2008, Deakin University, Melbourne

Wichert, R. (2002) A mobile augmented reality environment for collaborative learning and training, in M. Driscoll and T. Reeves (Eds.) *Proceedings of World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education (ELEARN) 2002*, Montreal, Canada, pp. 2386-2389

Wood, D. (2010) The benefits and unanticipated challenges in the use of 3D virtual learning environments in the undergraduate media arts curriculum, in G. Vincenti and J. Bramam (eds.) *Teaching through Multi-User Virtual Environments: Applying Dynamic Elements to the Modern Classroom*, IGI Global, Hershey, PA, pp. 236-258

Wood, D. (2010) Communicating in virtual worlds through an accessible Web 2.0 solution, *Telecommunications Journal of Australia*, Vol. 60, No. 2, pp. 19.1-19.16

Wood, D. (2009) Real life access to Second Life worlds: The potential, the problems and the possibilities for a barrier-free future, *The International Journal of Diversity in Organisations, Communities and Nations*, Vol. 8, No. 6, pp. 139-148

Wood, D. (2009) Experiential learning through 'real world' placements undertaken in 3D 'virtual world' spaces. *Same Places: Different Spaces. Proceedings of the 26th Annual ASCILITE Conference*, 6-9 December 2009, Auckland, New Zealand

Wood, D. and Hopkins, L. (2008) 3D virtual environments: businesses are ready but are our 'digital natives' prepared for the changing landscape?, *Hello! Where are you in the landscape of educational technology? Proceedings of 25<sup>th</sup> Annual ASCILITE Conference*, 20 November-3 December 2008, Deakin University, Melbourne

YouTube™ (n.d.) Captions and subtitles, retrieved 14 June 2011, <[http://www.youtube.com/t/captions\\_about](http://www.youtube.com/t/captions_about)>



## 11 Appendices

1	Ethics protocol for recruitment in Second Life	105
2	Case studies:	110
2.1	Accessible Interactive Media, UniSA	110
2.2	Client Services in Libraries and Information Resources and Services, ECU	110
2.3	Design for Interactive Multimedia, UniSA	111
2.4	Electronic Arts: Visual Theatre, UniSA	111
2.5	Electronic Publishing on the Internet, UniSA	111
2.6	From Mickey to Manga: Understanding the Animated Image, UniSA	112
2.7	Health Science Mammography, Lactation Clinic and Chiropractic Simulations, RMIT	112
2.8	Higher Degree (MEd and PhD) Research Students (HDR) Workshops, Monash	112
2.9	Information Literacy, University of Sheffield	113
2.10	Virtual Literacy Ethnography in Second Life, University of Sheffield	113
3	Evaluation protocol used in UniSA case studies	114
4	Survey instrument used to survey academics who were teaching in 3DVLEs	120
5	Detailed findings from analysis of the survey of academics	126
6	Hypothetical scenarios constructed from case study and survey findings:	135
6.1	Student research ethics	135
6.2	Probity in the student user	136
6.3	Student behaviour	136
6.4	Equity issues	137
6.5	IP issues	137
7	Instrument used to obtain feedback on accessibility issues experienced by people with disabilities	139
8	Detailed findings from analysis of user feedback	145
9	Guidelines for academics	



## Appendix 1: Ethics protocol for recruitment in Second Life

### Example recruitment letter to students

Dear Students

We are seeking students interested in participating in a 1 year university research project to study the pedagogical benefits of the application of mobile virtual learning environments (MVLE) together with three dimensional simulated environments (3DSE) that support a flexible, enquiry-based approach within the undergraduate and graduate curriculum,

By agreeing to be part of this project you would be joining a small number of students and university researchers enrolled or teaching in the courses which are our preliminary case studies.

For the first time these course will have a component using a 3 Dimensional Simulated environment, such as *Second Life* (SL). Second Life is a 3-D virtual world entirely created by its Residents. Since opening to the public in 2003, it has grown explosively and today is inhabited by millions of Residents from around the globe. Below is an image depicting a SL scenario.



**Figure 31:** Screen shot from *Second Life* included in the recruitment letter and information sheet distributed to students as part of the ethics approval process

We are specifically investigating the following questions:

- How will the learning objectives of the particular courses be achieved through the use of 3D simulated environments (3DSE) and mobile virtual learning environments (MVLE)?



- Is the use of immersive and experiential environments (3DSE) mobile virtual learning environments (MVLE) more effective in engaging student interest and learning?
- How does the use of immersive 3DSE and MVLE environments in Higher Ed classrooms change the nature of student and teacher and peer to peer interaction?
- How accessible are the interface and construction tools of the SL 3D environment for student engagement with the course material?
- How does the nature of the 3DSE and MVLE change teaching and assessment practices?

We will be seeking anonymous responses through the UniSA survey tool TellUs 2. and for those participants who indicate their interest in participating, we will be then having a follow up of real life and virtual focus groups.

Your privacy will be respected at all times. Your own name will not be used in any published material. You may withdraw for the project at any time. Although there will be no payment from the University for your participation over the year, you will be given a copy of any material published on this work if you would like to receive it.

Please contact me for any further information at the address and numbers below. Additional information can be obtained from:

Dr Denise Wood  
Principal Researcher,  
University of South Australia, SA 5072  
Phone: 83024642  
Fax: 83024745  
Email: [denise.wood@unisa.edu.au](mailto:denise.wood@unisa.edu.au)

A/Prof Geraldine Bloustien  
Principal Researcher  
University of South Australia, SA 5072  
Phone: 83024638  
Fax: 83024745  
Email: [gerry.bloustien@unisa.edu.au](mailto:gerry.bloustien@unisa.edu.au)





## Example recruitment letter to people with disabilities

Dear Wheelies members

I am writing to invite you to participate in a university research project to study the value and accessibility of 3D simulated mediated environments such as Second life in a range of disciplines and organizations. A small honorarium of 5,000 Linden dollars will be paid as a token of our appreciation for your participation.

We are specifically investigating the following questions:

- What are the social and cultural impacts of engagement in Three Dimensional Simulated Environments?
- How can 3D Simulated Environments work as tools for learning and gaining new knowledges (both within and outside of educational institutions)?
- How can 3D Simulated Environments increase the possibility of social networking and new relationships?
- How do 3D Simulated Environments change / adapt for more sophisticated mobile interfaces (mobile phones, I-phones, mobile games devices etc)?
- What are appropriate techniques for designing usable and accessible interfaces to 3D Simulated Environments?
- How can 3D Simulated Environments be improved for users with disabilities?

Your participation in this study is entirely voluntary and your privacy will be respected at all times. All records containing personal information will remain confidential and no information which could lead to identification of any individual will be released. Your own name will not be used in any published material. The researcher will take every care to remove responses from any identifying material as early as possible. Likewise individuals' responses will be kept confidential by the researcher and not be identified in the reporting of the research. However, the researcher cannot guarantee the confidentiality or anonymity of material transferred by email or the internet.

You may withdraw from the project at any time. A small honorarium of 5,000 Linden Dollars will be provided as a token of our appreciation for your time in assisting with our research. You will also be given a copy of the final report based on the findings of this project at the completion of the study in August 2010 if you indicate in the consent form that you would like to receive it.

The raw data will be stored in a locked filing cabinet, in the office of Associate Professor Gerry Bloustien, at the University of South Australia for 7 years after the project has been completed. Only I, and the university researchers involved in the project will have access to the raw data for the purposes of the research.

Please contact me in Second Life by IM to Denlee Wobbit or email me at [denise.wood@unisa.edu.au](mailto:denise.wood@unisa.edu.au) if you are interested in participating.



Additional information can be obtained from:

Vicki Allen

ph: +61 88302 3118

Ethics officer

fax: +61 88302 3921

Research services

email [Vicki.Allen@unisa.edu.au](mailto:Vicki.Allen@unisa.edu.au)

Mawson Lakes Campus

University of South Australia:

Dr Denise Wood

C2-33B

School of Communication

St Bernards Road



## Consent form for users with disabilities

### Consent form for UniSA approved research project

Project title: 3D Virtual Simulated Environments

Researcher's name(s): Dr Denise Wood and Associate Professor Gerry Bloustien

- I have read the information sheet, and the nature and the purpose of the research project have been explained to me. I understand and agree to take part.
- I understand that I may not directly benefit from taking part in the project.
- I understand that I can withdraw from the study at any stage and that this will not affect my status now or in the future.
- I understand that if I agree to participate in a RL focus group I may be audio-recorded during the study. I grant the University the exclusive and royalty free right to reproduce and use in its ongoing activities any recording by any means of my voice which is produced in the course of the project. The audio recorded from such interviews will be used for the purposes of transcription to text. Participants' wishes with respect to publication, and the use of any recordings will be respected at all times.
- I understand that the university shall not be required to make any payment to me arising out of its exercise of this right. However, we are able to provide you with 5000 Linden Dollars as a token of our appreciation for your time in assisting with our research. You may also elect to receive a copy of publications arising from this study.
- I understand that wherever practical, the university will acknowledge my participation in the project.
- I understand that the raw data will be stored in a locked filing cabinet, in the office of Associate Professor Gerry Bloustien, at the University of South Australia for 7 years after the project has been completed. Only I, and the university researchers involved in the project will have access to the raw data for the purposes of the research.

Name of participant:.....

Please provide email address if you would like to receive a copy of the final report.



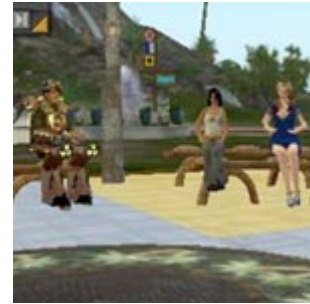
## Appendix 2: Case Studies

Ten case studies were constructed to explore the pedagogical benefits of 3DVLEs and identify challenges in teaching in 3DVLEs across different disciplinary fields. The complete case studies are available for download from the project site. The following sections provide abstracts of each case study and links to the download sites.

### 2.1 Accessible Interactive Media

*University of South Australia*

The Accessible Interactive Media course introduces students to the principles of usability and accessibility in Web design, and gives students the chance to create websites for 'real clients'. In this case study, students undertook their projects with health and disability related groups located in *Second Life*. The virtual world was used as a conduit enabling students to liaise with their clients and attend debriefing meetings with the course coordinator, and members of the disability support groups.



The key learning outcomes for the students were to:

- demonstrate an understanding of the needs of users with disabilities and the importance of web accessibility;
- demonstrate understanding of the W3C Web Content Accessibility Guidelines, website analysis and the use of accessibility auditing tools;
- design and develop an accessible website for their allocated client.

[Download the Accessible Interactive Media case study.](#) (Word Doc Format)

### 2.2 Client Services in Libraries and Information Science

*Edith Cowan University*

This case study by Dr Judy Clayden, Ms Jude Elund and Professor Lelia Green, explored the use of *Second Life* as a medium for Library and Information Services students to practice conducting effective reference interviews. Students role played client/librarian relationships in the virtual world and were given the opportunity to share their views about the experience.



[Download the Client Services in Libraries and Information Science case study.](#) (Word 2007 Doc Format)



## 2.3 Design for Interactive Media

*University of South Australia*

This course saw the use of *Second Life* to allow students to create and customise their own interactive game inside the virtual environment.

The key learning outcomes for students were for them to:

- work collaboratively and communicate effectively with team members;
- solve complex problems in a complex gaming environment;
- design and develop an interactive game in a 3D virtual world;
- engage in reflective practice through peer review.



[Download the Digital Interactive Multimedia case study.](#)(Word Doc Format)

## 2.4 Electronic Arts: Visual Theatre

*University of South Australia*

This course made use of *Second Life* as a medium for experimental theatre, combining real actors live onstage with virtual counterparts, that were being controlled 'live' through the *Second Life* environment, projected on stage.

Students completing the course were required to demonstrate their understanding and mastery of visual theatre concepts based on the following criteria:

- Integration of the live performer with the projected image.
- Live body extension, posture and balance.
- Live and virtual bodies, voices and characters.
- Rhythm of live and projected action.
- Relating to the audience.
- Geography of *Second Life*.



[Download the Electronic Arts: Visual Theatre case study.](#)(Word Doc Format)

## 2.5 Electronic Publishing on the Internet

*University of South Australia*

This course combined activities in *Second Life* with web design activities undertaken in class to provide a means by which students could build their professional portfolios with a consistent presence across both the web and 3D environments.

The key learning outcomes for the students were to:





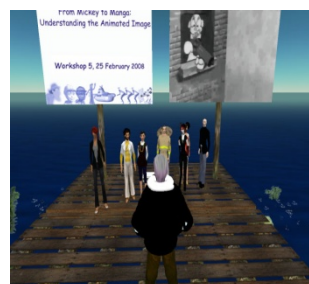
- design and develop a portfolio presence in a 3D virtual world ;
- design and develop a complementary Website linked to their 3D world 'shop front' portfolio in Second Life;
- create an online feedback form enabling students to critique each other's portfolios and engage in reflective practice.

[Download the Electronic Publishing on the Internet case study.](#)(Word Doc Format)

## 2.6 From Mickey to Manga: Understanding the Animated Image

*University of South Australia*

The course, *From Mickey to Manga* provided students with the opportunity to theorise and critique newer forms of media and apply their knowledge through three dimensional screen animation and immersive games. The use of *Second Life* allowed students to interact learn, study, work and interact off campus and from remote locations, while also immersing themselves in the course material by becoming avatars themselves.



[Download the case study.](#)(Word Doc Format)

## 2.7 Health Science Mammography, Lactation Clinic and Chiropractic Simulations

*Royal Melbourne Institute of Technology / University of South Australia*

This project investigated the engagement, student experience and flexibility of using a 3DVLE to simulate the patient history taking process in health science related fields. Students practiced effective communication skills and strategies by role playing scenarios involving interactions with patients to determine important information essential to their treatment.



[Download the case study.](#)(Word DocX Format)

## 2.8 Higher Degree (MEd and PhD) Research Students (HDR) Workshops

*Monash University*

The aim of this case study was to explore the implications for students and lecturers of using a 3DVLE in delivering Higher Degree Research Student (HDR) workshops. Students participated in several online workshops, dealing with subjects such as abstract writing and research ethics, and they were invited to evaluate the effectiveness of *Second Life* as a platform for delivery of learning activities for HDR Students.



[Download the HDR Workshops case study.](#)(Word DocX Format)



## 2.9 Information Literacy (core Level 1 module in the programme, BSc Information Management)

*University of Sheffield*

This course, which is designed to progress students' information literacy and develop their understanding of information literacy theories and practice, utilised *Second Life* as part of a blended learning approach, enabling students to perform online interviews, undertake research projects and create presentations to display in an online environment.



[Download the Information Literacy case study.](#) (Word Doc Format)

## 2.10. Virtual Literacy Ethnography in Second Life

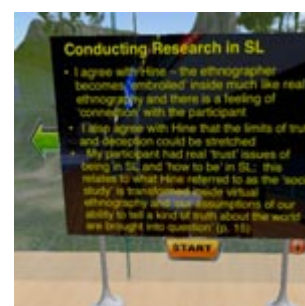
*University of Sheffield*

This course considered how new technologies are affecting the way literacy and language conventions are changing and at the ways in which we are using literacy and language differently in a digital age, focusing on *Second Life*.

The aims of the unit were to introduce students to the concept of virtual ethnography and to enable them to conduct an ethnography of literacy practices in *Second Life*.

Objectives:

- To develop students' understanding of the nature of ethnography in virtual worlds.
- To enable students to undertake an ethnographic study of literacy in an area of Second Life (i.e. a specific location, or with a group of specific participants).
- To familiarise students with literacy practices undertaken in Second Life and enable them to reflect on these in the light of previous work on the nature of literacy in a digital age.



[Download the Ethnography in Second Life case study.](#) (Word 2007 Doc Format)



## Appendix 3: Evaluation protocol used in UniSA case studies

Example of the online questionnaire students completed at the end of the course.

### Experiences using 3D virtual worlds such as Second Life in courses at UniSA

Thank you for agreeing to participate in this survey. Data collected through this survey will be used to improve the quality of teaching and learning at UniSA and could also be used in external publications and presentations. Individual responses will remain confidential and no individuals will be identified.

Demographic

What is your Program at UniSA?

(Enter text into this box, maximum 2000 characters)

Age Range

Gender

Computer Use

How often do you use a computer at home?

How often do you use a computer at University?

How often do you use chat software / instant messenger (e.g. AOL, MSN, ICQ, etc)?

How often do you use social networking sites (e.g. Facebook, MySpace, Flickr.)?



How often do you use online multi-user computer games (e.g. World of Warcraft, Everquest, etc)?

How often do you use 3D online virtual worlds such as Second Life?

How often do you use social bookmarking sites?

How often do you use the computer to access podcasts / webcasts?

Internet Access

Do you use a high speed connection to the Internet from home or dial-up?

Second Life Student Survey

What communication tools did you use?

- ☐ None
- ☐ *Second Life* chat tool
- ☐ *Second Life* audio tool (Voice Over IP - VOIP)
- ☐ Tools outside of Second Life (discussion boards, chat, blog, etc)
- ☐ Other (explain in final comments)

How would you classify your performance in this course (i.e. grades)?

- ☒ Excellent
- ☒ Above Average
- ☒ Average
- ☒ Below Average



- Poor
- Other (explain in final comments)

#### Social Presence (immediacy and intimacy)

I felt as if I was communicating with a real person in *Second Life*.

I was able to be expressive in *Second Life*.

I was comfortable interacting with other participants in *Second Life*.

#### Engagement

I was engaged in the learning experience in *Second Life*.

*Second Life* was an enriching experience.

The learning experiences were active and collaborative in *Second Life*.

Using *Second Life* was fun and exciting.

I was willing to put in the effort needed to complete the learning activities in *Second Life*.

*Second Life* was a waste of time.

#### Online Learning Community

The learning activity encouraged contact between myself and my classmates





in Second Life.

Satisfaction

I would take another course that used Second Life.

I would recommend that the instructor continue using Second Life.

I liked using Second Life as part of my course.

Participating in Second Life was a useful experience.

It was difficult to access Second Life.

Getting into Second Life was easy.

Technical support was available when I needed it in Second Life.

I would avoid classes using Second Life in the future.

I would not recommend this course to a friend.

Learning

Second Life allowed me to better understand concepts.

Using Second Life helped me think more deeply about course material.



Second Life did not help my learning in the class.

Online learning design (support, design, delivery, assessment)

The introductory explanations on how to use Second Life were clear.

The activity in Second Life was well organized.

I understood all components of the activity in Second Life.

The instructions for Second Life were clear.

The activity offered opportunities for interaction and communication in Second Life.

The goals in Second Life were clearly defined.

I understood what was expected of me in Second Life.

### Open-Ended Questions

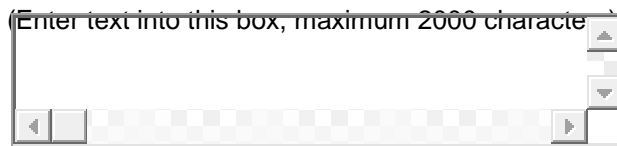
How did Second Life impact your communication and interaction with others in this course?

(Enter text into this box, maximum 2000 characters)

How was using Second Life different than using tools in a Course Management System, like discussions or chat tools?

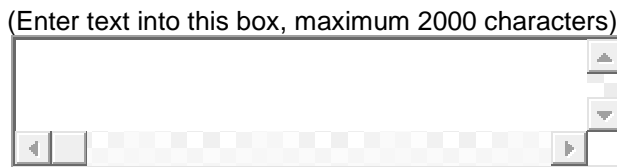


(Enter text into this box, maximum 2000 characters)



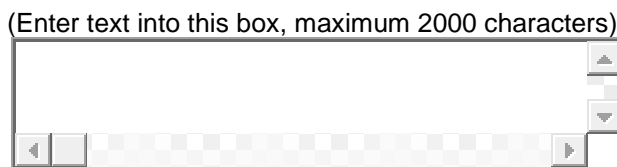
What was one thing that you would change about your experience in Second Life?

(Enter text into this box, maximum 2000 characters)



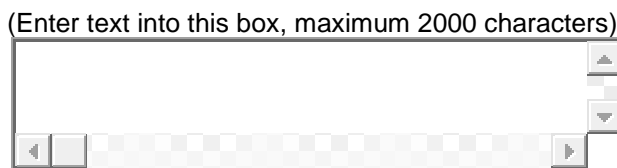
47. What was one thing that you liked about your experience in Second Life?

(Enter text into this box, maximum 2000 characters)



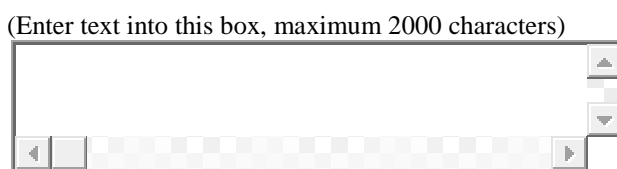
48. How did Second Life impact your learning for this course?

(Enter text into this box, maximum 2000 characters)



49. Is there anything else you would like to share with us about your experience?

(Enter text into this box, maximum 2000 characters)



## Appendix 4: Instrument used to survey academics teaching in 3DVLEs



### ETHICS OF TEACHING IN SECOND LIFE

This survey addresses a number of aspects related to probity, behaviour and equity in the use of virtual worlds in learning and teaching at a university level. Please answer the following questions based on your own personal experience in the use of a virtual world in learning and teaching. Some of the questions also relate to what you know of the experiences of your colleagues.

#### 1. Background information

1.1 Which virtual world have you used in your teaching? *(you may choose more than one answer)*

- ☐ Second Life
- ☐ OpenSim
- ☐ Other (please specify) .....

1.2 What discipline would best describe the area in which you teach? *(you may choose more than one answer)*

- ☐ Education
- ☐ Arts
- ☐ Humanities
- ☐ Social and behavioural sciences
- ☐ Journalism and information
- ☐ Business
- ☐ Law
- ☐ Science
- ☐ Engineering
- ☐ Manufacturing and processing



- ☐ Architecture and building
- ☐ Agriculture
- ☐ Health and welfare
- ☐ Other (please specify) .....

1.3 Please explain your use of the virtual world in learning and teaching (*eg virtual lectures/instruction; virtual design work by students etc*)

1.4 What do you expect your students to do in the virtual world?

1.5 What benefits do you expect your students to gain from their use of the virtual world?

## 2. Probity in the student user

2.1 Do you use the virtual world for the purposes of assessment?

☐ Yes

☐ No (*please proceed to 2.3*)

2.2 If yes to 2.1, how do you ensure that the avateer (ie the person operating the avatar) is the student being assessed? If you have a policy/rules etc may we please have a copy? (*could you please provide a copy of your policy with your response to this survey or supply the relevant url*)





2.3 In your use of the virtual world in learning and teaching, do you require students to reveal their real life identities to you or other students?

☐ Yes

☐ No

2.3 If yes to 2.3:

(a) How do students reveal their real life identities to you and/or other students?

(b) Has the requirement that students reveal their real identities caused any problems for you and/or your students? *For example, have any students objected on the grounds that they prefer to remain anonymous because they use their avatars for other, non-educational purposes or because they may attract criticism from other students?*

2.4 Any further comments on ensuring the student is the avateer?

### 3. Student behaviour

3.1 From your own experience of using the virtual world in learning and teaching, or your knowledge of the experience of your colleagues, have you or your colleagues encountered misbehaviour by a student in the virtual world? For these purposes *misbehaviour* includes but is not limited to:

- inappropriate avatar appearance
- students disrupting proceedings in the virtual world
- harassment or bullying of other students or academics in the virtual world
- use of abusive, derogatory, discriminatory or demeaning language or images towards other students or academics
- sharing personal information about other students to others in the virtual world



- “assaulting” (eg pushing, shoving etc) other students or academics in the virtual world
- students being distracted from proceedings in the virtual world by matters in the real world

☐ Yes

☐ No (*please proceed to 3.3*)

3.2 If yes to 3.1:

(a) Please give details of the misbehaviour and how you or your colleague responded to it.

(b) Is this the same response that you would have made if you were responding to the same or similar behaviour in the real world? If the response is different, please explain why.

3.3 In the event of student misbehaviour in the virtual world, when (if at all) should your response be confined to the virtual world and when (if at all) should you also respond in the real world?

3.4 Do you or your colleagues have a policy/rules etc concerning student behaviour in the virtual world?

☐ Yes

☐ No (*please proceed to 3.6*)



3.5 If yes to 3.4:

(a) May we please have a copy of your policy/rules etc? *(could you please provide a copy with your response to this survey or supply the relevant url)*

(b) How are your students made aware of your policy/rules etc?

(c) How, if at all, are the policy/rules etc connected to your university's general policies governing use of information technology and/or student conduct?

(d) We may wish to make further contact with the people who developed and/or administer your policy/rules etc. If you know who these people are could you please advise their names, positions and email contact details.

3.4 Any further comments on student behaviour in the virtual world?

#### 4. Equity issues

4.1 How do your students access the virtual world for your learning and teaching activity? *(you may choose more than one answer)*

☐ University provided computers on campus (eg computer laboratory)

☐ University provided computers off campus (eg computers on loan)

☐ Other computers on campus (eg student owned computer connecting on campus)



☐ Other computers off campus (eg student owned computer connecting from home)

☐ Other (please specify) .....

4.2 How do you deal with students who have different proficiency in the use of virtual worlds, particularly where the virtual world is being used for assessment? *For example, do you provide some form of orientation or some form of support? Do you expect students to assist other students who are less proficient in their use of the virtual world? If not, how do students who are less proficient obtain assistance?*

4.3 How do you deal with students who have different levels of connectivity, particularly where the virtual world is being used for assessment? *For example, how do you deal with students having different bandwidths, limited internet allowances, different computer hardware such as graphics cards, drivers etc?*

4.4 Any further comments on ensuring students have equity of access to the virtual world?

**Thank you for your assistance with this study.**

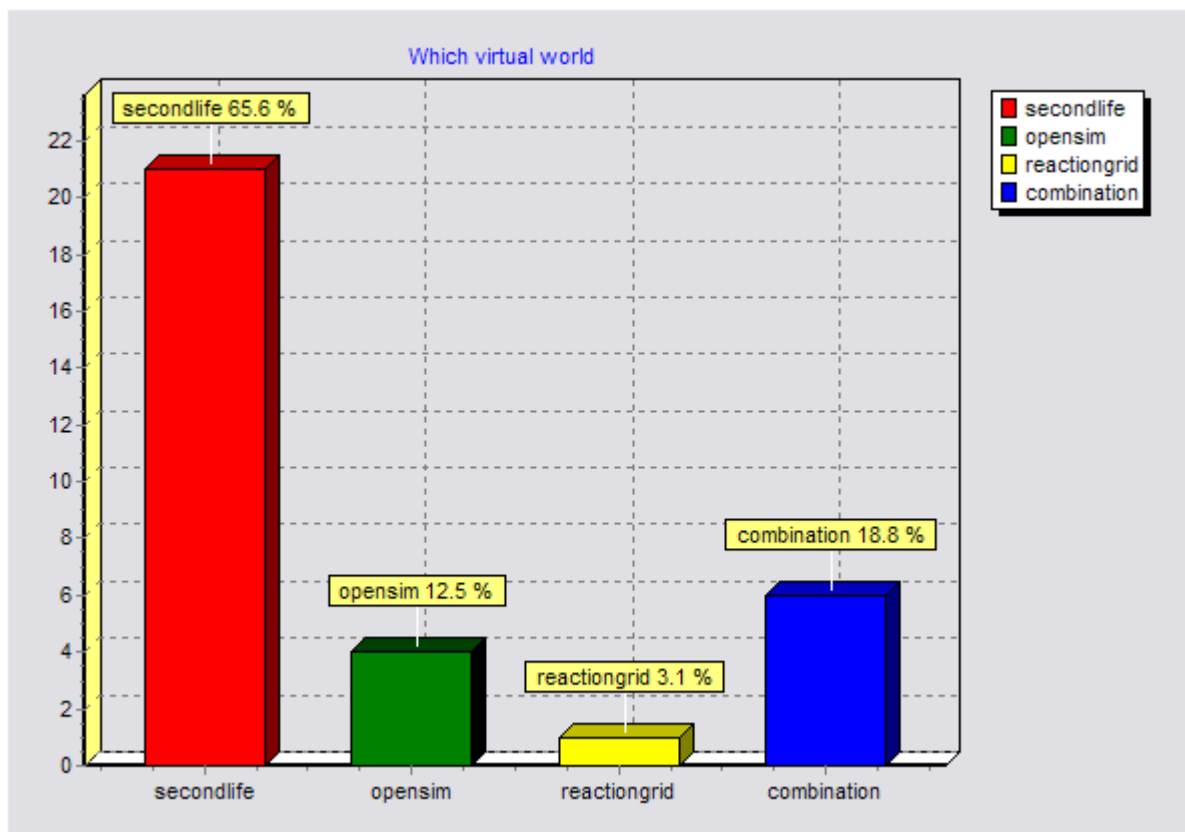


## Appendix 5: Detailed findings from analysis of the survey of academics

### Survey of academics teaching in 3D virtual worlds

**Table 17:** Which 3D virtual world (3DVE) is used in teaching and learning?

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Second life	21	65.6	65.6	65.6
	OpenSim	4	12.5	12.5	78.1
	Reaction grid	1	3.1	3.1	81.3
	combination	6	18.8	18.8	100.0
	Total	32	100.0	100.0	



**Figure 32:** Graphical representation showing 3DVEs reported to be used by respondents to the survey of academics





**Table 18:** What prompted you to become involved in 3DVLEs (survey respondents)?

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Ability to control world and elements, free	1	3.1	3.1	3.1
	Already established at academic institution	7	21.9	21.9	25.0
	Already established at academic institution, more stable and advanced than OpenSim	1	3.1	3.1	28.1
	Already established at academic institution, one of few existing at the time	1	3.1	3.1	31.3
	Already established at academic institution, widely accepted	1	3.1	3.1	34.4
	already established, prospects for longevity, ease of use, control over persons entering our space	1	3.1	3.1	37.5
	Both are compatible and used extensively in academic community	1	3.1	3.1	40.6
	Ease of access, number of users, and maturity of systems	1	3.1	3.1	43.8
	Free, options for management/development	1	3.1	3.1	46.9
	More advanced, used by more academics, easy access for publicising	1	3.1	3.1	50.0
	Most flexible for educational purposes, more well known through media interest	1	3.1	3.1	53.1
	Most mature at the time	1	3.1	3.1	56.3
	Most visible at the time, welcoming community	1	3.1	3.1	59.4
	Networking with other universities	1	3.1	3.1	62.5
	No reason given for choosing this particular VW	1	3.1	3.1	65.6
	Only one available when program started	1	3.1	3.1	68.8
	Options for study in collaboration with businesses	1	3.1	3.1	71.9
	Own familiarity, on campus support staff	1	3.1	3.1	75.0

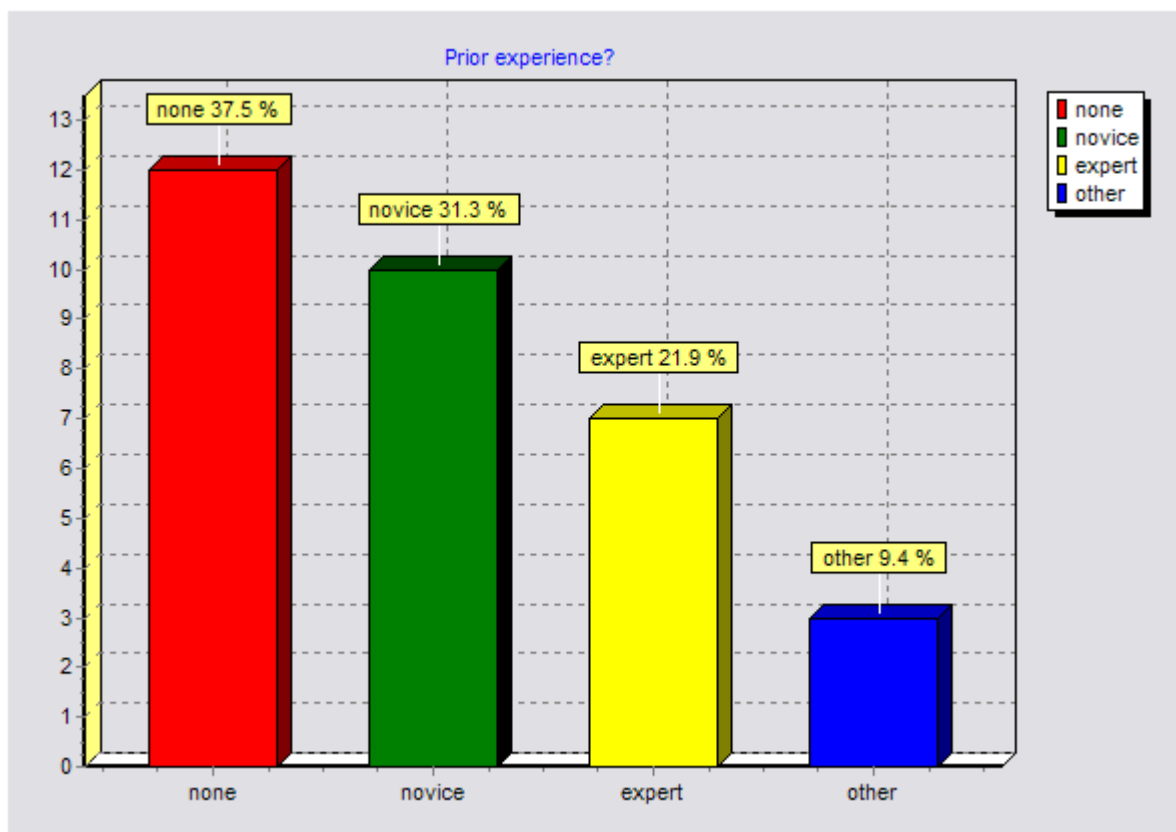


RG has more passive type of security, budgeting reasons	1	3.1	3.1	78.1
SL – big, interesting, established world. Large Audience. OS – greater control over avatar names and worlds, privacy	1	3.1	3.1	81.3
SL (well developed) Reaction Grid (cheaper and OK for younger students) Neverwinter Nights (good for digital storytelling) Machinima (cheap)	1	3.1	3.1	84.4
Ubiquitous, large community, no requirement to maintain servers (unlike OS), development opportunities	1	3.1	3.1	87.5
Use both – for collaborative environment	1	3.1	3.1	90.6
Useful for teaching marketing – entrepreneurial nature and operating economy	1	3.1	3.1	93.8
Well established, easy to access worldwide, stable	1	3.1	3.1	96.9
Widely accepted	1	3.1	3.1	100.0
Total	32	100.0	100.0	

**Table 19:** Prior experience using 3DVEs reported by respondents to survey

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid none	12	37.5	37.5	37.5
novice	10	31.3	31.3	68.8
expert	7	21.9	21.9	90.6
other	3	9.4	9.4	100.0
Total	32	100.0	100.0	





**Figure 33:** Graph showing 3DVE experience of respondents to the survey of academics teaching in 3DVLEs

**Table 20:** Other experience using 3DVEs reported by respondents to survey

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	28	87.5	87.5	87.5
Moderate	3	9.4	9.4	96.9
Moderate – self taught	1	3.1	3.1	100.0
Total	32	100.0	100.0	



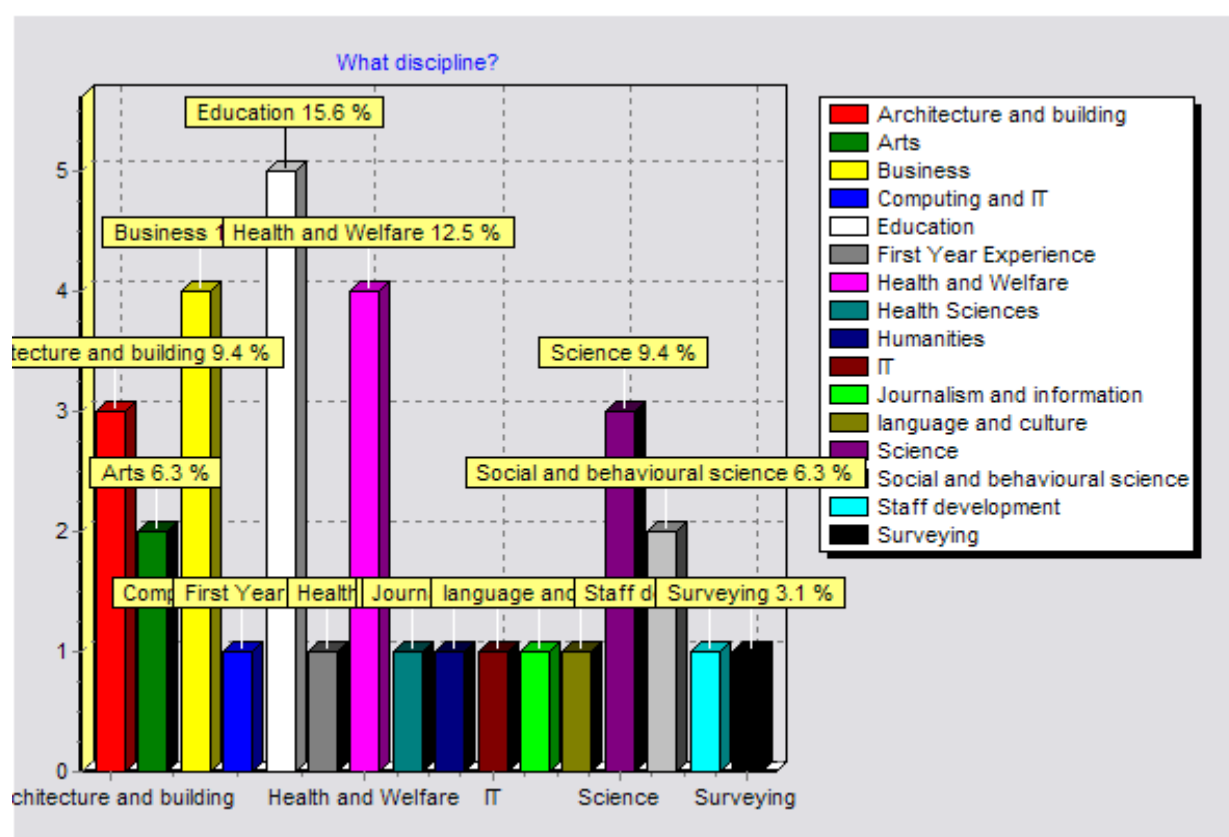
**Table 21:** Disciplines represented in the responses to survey of academics

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Architecture and building	3	9.4	9.4	9.4
	Arts	2	6.3	6.3	15.6
	Business	4	12.5	12.5	28.1
	Computing and IT	1	3.1	3.1	31.3
	Education	5	15.6	15.6	46.9
	First Year Experience	1	3.1	3.1	50.0
	Health and Welfare	4	12.5	12.5	62.5
	Health Sciences	1	3.1	3.1	65.6
	Humanities	1	3.1	3.1	68.8
	IT	1	3.1	3.1	71.9
	Journalism and information	1	3.1	3.1	75.0
	language and culture	1	3.1	3.1	78.1
	Science	3	9.4	9.4	87.5
	Social and behavioural science	2	6.3	6.3	93.8
	Staff development	1	3.1	3.1	96.9
	Surveying	1	3.1	3.1	100.0
	Total	32	100.0	100.0	

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid		20	62.5	62.5	62.5
	Arts	1	3.1	3.1	65.6
	Arts/Humanities/Education	2	6.3	6.3	71.9
	Business	1	3.1	3.1	75.0
	communication	1	3.1	3.1	78.1
	Engineering	2	6.3	6.3	84.4
	Geography	1	3.1	3.1	87.5
	Higher Ed Academic Orientation	1	3.1	3.1	90.6
	IT	1	3.1	3.1	93.8
	Science	1	3.1	3.1	96.9
	Virtual Technology and Design	1	3.1	3.1	100.0
	Total	32	100.0	100.0	



	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	27	84.4	84.4	84.4
information science	1	3.1	3.1	87.5
Law	1	3.1	3.1	90.6
Science	1	3.1	3.1	93.8
Social and behavioural science	2	6.3	6.3	100.0
Total	32	100.0	100.0	



**Figure 34:** Graph showing disciplinary fields of respondents to the survey

**Table 22:** Is the 3DVLE used for assessment?

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	yes	20	62.5	62.5	62.5
	no	12	37.5	37.5	100.0
	Total	32	100.0	100.0	



**Table 23:** Do students reveal identity in the 3DVLE?

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid    yes	21	65.6	65.6	65.6
no	11	34.4	34.4	100.0
Total	32	100.0	100.0	

**Table 24:** Do academics report any concerns with student misbehaviour in 3DVLEs?

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid    yes	14	43.8	43.8	43.8
no	18	56.3	56.3	100.0
Total	32	100.0	100.0	

**Table 25:** Do academics report having policies governing student behaviour in 3DVLE

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid    yes	11	34.4	34.4	34.4
no	21	65.6	65.6	100.0
Total	32	100.0	100.0	

**Table 26:** Does the university provided computers on campus that can run 3DVLE software for students undertaking courses in a 3DVLE?

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid    yes	29	90.6	90.6	90.6
no	3	9.4	9.4	100.0
Total	32	100.0	100.0	





**Table 27:** Does the university provide computers off campus for students requiring access to 3DVLEs?

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	yes	4	12.5	12.5	12.5
	no	28	87.5	87.5	100.0
	Total	32	100.0	100.0	

**Table 28:** Do students reveal identity? \* Policy for behaviour?

**Crosstab**

			Policy for behaviour?		Total
			Yes	no	
Do students reveal identity?	yes	Count	8	13	21
		Expected Count	7.2	13.8	21.0
	no	Count	3	8	11
		Expected Count	3.8	7.2	11.0
Total	Count		11	21	32
	Expected Count		11.0	21.0	32.0

**Table 29:** Do students reveal identity? \* Use for assessment?

**Crosstab**

			Use for assessment?		Total
			Yes	no	
Do students reveal identity?	yes	Count	13	8	21
		Expected Count	13.1	7.9	21.0
	no	Count	7	4	11
		Expected Count	6.9	4.1	11.0
Total	Count		20	12	32
	Expected Count		20.0	12.0	32.0



**Table 30:** Any misbehaviour? \* Policy for behaviour?**Crosstab**

			Policy for behaviour?		Total
			Yes	no	
Any misbehaviour?	yes	Count	6	8	14
		Expected Count	4.8	9.2	14.0
	no	Count	5	13	18
		Expected Count	6.2	11.8	18.0
Total	Count		11	21	32
	Expected Count		11.0	21.0	32.0

**Table 31:** Any misbehaviour? \* Use for assessment?**Crosstab**

			Use for assessment?		Total
			Yes	no	
Any misbehaviour?	yes	Count	9	5	14
		Expected Count	8.8	5.3	14.0
	no	Count	11	7	18
		Expected Count	11.3	6.8	18.0
Total	Count		20	12	32
	Expected Count		20.0	12.0	32.0



## Appendix 6: Hypothetical scenarios constructed from case study and survey findings

### Hypothetical 1: Student research ethics

You ask students to research 3DVLE behaviour on virtual islands run by various universities.

1. *What assurances of confidentiality should your students offer?*
2. *How should they negotiate informed consent?*
3. *What risks might interviewees incur by talking to your students?*

As part of the process of negotiating informed consent with key informants, you offered to preserve the anonymity of the virtual island, the institution and individuals, although you pointed out that it might be difficult to stop other members of the virtual island's University identifying particular individuals.

You give an interview to a national newspaper about student culture, avoiding any details about this particular research project. The newspaper reports your work as covertly digging up the dirt on student relationships. You hear that several of your research participants are distressed, believing that what they have said to you will be identified by other students.

The Universities involved in the research send you a letter claiming that you misrepresented your research interest and they complain to the company that hosts and manages the virtual world. The Universities block access to their virtual islands and instruct you not to publish data from this site.

4. *What would you do in response to ...*
  1. *the media portrayal of your research?*
  2. *student distress?*
  3. *the letter from the universities?*
  4. *the letter to the host company?*



## Hypothetical 2: Probity in the student user

Students posting anonymously to an online discussion board indicate that students in later years have been completing assignments for new students in 3DVLE.

*The local media have contacted your Vice-Chancellor/President and she has asked educators to brief her on the ways that your institution has been and will be responding to the problem. You have been asked to contribute to this response. What would you tell her?*

## Hypothetical 3: Student behaviour

You have moved jobs to teach at a new institution. You looked around the university's 3DVLE virtual island and found evidence that students had been disrupting the virtual environment by vandalising objects and littering the virtual island. Pornographic material was also present on the site.

1. *What policies and practices should your institution adopt to respond to such activity?*

When you started teaching, several students began disrupting your virtual classes in 3DVLE by:

- a. Wearing inappropriate clothing
- b. Bringing in friends who were not enrolled in the class
- c. Flying through lectures
- d. Activating equipment at inappropriate times
- e. Swearing
- f. Removing objects created as part of assignments by other students
- g. Acting violently towards other students

2. *How would you respond to such disruption?*

After a few weeks, you were approached in the 3DVLE by anonymous students who complained their learning was being disrupted by student bullying and that they had seen one student harassing and stalking another student.

3. *How would you respond to these complaints and concerns?*



#### Hypothetical 4: Equity issues

Another university has just completed a course evaluation and have identified that students were unhappy about being required to undertake studies involving 3DVLE. The feedback identified the following reasons for their dissatisfaction. The institution asks you to offer advice on how to respond:

The feedback identified the following reasons for their dissatisfaction. The institution asks you to offer advice on how to respond:

1. Synchronous assessment is making it difficult for external students who are working to attend required virtual classes and meet assessment requirements
2. The university has blocked access to 3DVLE from where some students live
3. Several students complain because they cannot afford necessary equipment
4. Some students report that they cannot participate in the virtual classes as they have inadequate bandwidth from where they live
5. Others complained that there is inadequate technical support to enable them to successfully participate in the virtual classes
6. Some students can't afford the cost of uploading content to the public server
7. Students with disabilities report that they are unable to take part in the course
8. A few students object to entering the 3DVLE environment where they may be subject to socially inappropriate behaviour.

#### Hypothetical 5: IP issues

A university colleague is looking to purchase a virtual island (SIM) in the 3D virtual world known as Second Life (SL) for the purposes of teaching a games design course in SL. Your colleague believes that the collaborative and creative nature of the virtual world environment is ideally suited for his course, in which students work in teams to design multi-user games. He has received funding for the project and is very keen to purchase the virtual island and begin developing content, having seen evidence of the effectiveness of this approach in improving student learning outcomes at other universities. However, his supervisor will not permit him to proceed with the purchase because she is concerned about several potential IP issues that could arise. Your colleague advises you that his supervisor is very risk averse. She initially ignored the request and then came up with several objections based on her reading of the Linden Lab (LL) Terms of Service (TOS). (Linden Lab is the company that owns and manages Second Life).

The supervisor has pointed out that when a user “purchases” a virtual island, they are only buying a limited license to access and use features of the service. She argues that this raises several IP related issues:

- According to Linden Lab TOS, users agree that by uploading, publishing, or submitting any content to or through the Servers, Websites, or other areas of the Service, users are



automatically granting Linden Lab a non-exclusive, worldwide, royalty-free, sublicenseable, and transferable license to use, reproduce, distribute, prepare derivative works of, display, and perform the Content solely for the purposes of providing and promoting the Service. *This means any IP your colleague creates for teaching purposes can be used by the company that owns the virtual world for any purpose they choose.*

- The TOS also requires users to agree that by uploading, publishing, or submitting any content to any publicly accessible areas of the virtual world they are granting other users of SL a non-exclusive license to access their content through the virtual world. *If your colleague does not use the SL virtual land tools to limit or restrict access to their virtual island (SIM), other users (including those who are not your colleague's students) will be able to access that virtual space and also use, reproduce, distribute, prepare derivative works of, display, and perform your colleague's and/or students' content in-world.*
- If your colleague deletes copies or instances of their content that are in their account inventory through the normal functionality of the service, then under the TOS this deletion *will not apply to any other copies or instances of the same content that may be displayed elsewhere and copies that may be in the account inventories of other users to whom your colleague or their students transferred copies.*
- The TOS requires users to agree that by uploading, publishing, or submitting any content to or through the servers for display In-World in any publicly accessible area of the service, they are granting each user of SL and LL a non-exclusive, worldwide, royalty-free, sublicenseable and transferable license to photograph, capture an image of, film, and record a video of the content, and to use, reproduce, distribute, prepare derivative works of, display, and perform the resulting photograph, image, film, or video in any current or future media. *This means that your colleague's teaching materials and student work could be used by other users in SL unless your colleague and his students use the SL permissions system to set the "copy, modify, and transfer settings" on each object they create.*
- If the user has his or her account terminated by LL for breaching the LL TOS they will no longer be able to access their account, content or data stored on the LL servers. *This means that your colleague and their students may lose access to all the content they have created for and during the course.*
- The LL TOS prohibit users from uploading material of which they do not own copyright. Under their TOS any reports of alleged copyright infringement can lead to termination of the accounts of repeat infringers.

How would you reassure the supervisor that appropriate policies can be put in place to ensure these risks are mitigated?





## Appendix 7: Instrument used to obtain feedback on accessibility issues experienced by people with disabilities

### 3D Virtual World Technologies and Accessibility Guidelines Survey

Please circle or indicate your answers as appropriate and submit your responses to Dr. Denise Wood in one of the following ways:

1. You may complete this form on paper, scan and email to [denise.wood@unisa.edu.au](mailto:denise.wood@unisa.edu.au)
2. You may refer to the question number and answer your responses in email form to [denise.wood@unisa.edu.au](mailto:denise.wood@unisa.edu.au)
3. You may arrange to provide your answers via voice by emailing Dr. Denise Wood and arranging a time with one of the team members to assist you with recording your response.

#### Demographic Information:

1. Real Life Name:
2. Avatar Name:
3. Impairments affecting computer use (ie: deaf, blind, visually or mobility impaired):
4. Years of experience in virtual worlds:
5. Virtual World platforms used:

#### Virtual World Viewer Accessibility Guidelines

When answering the following questions please refer to your experience with current 3D virtual world viewers or *AccessGlobe* where appropriate.

1. Current 3D virtual world viewers support the adjustment of chat text size and color. How important is this feature for accessibility?

Least Important    Important    Neutral    Very Important    Most Important    N/A



2. The tab-index (tab-over) feature is less usable in Second Life Viewer 2. AccessGlobe and other 1.x viewers included tab-index (tab over) to move between options. How important is the tab-index feature for accessibility?

Least Important   Important   Neutral   Very Important   Most Important   N/A

3. AccessGlobe includes a text-to-speech interface. How important do you find this feature to be for accessibility?

Least Important   Important   Neutral   Very Important   Most Important   N/A

4. MaxVoice and AccessGlobe provide a text list of avatars in the vicinity. How important is this feature for accessibility?

Least Important   Important   Neutral   Very Important   Most Important   N/A

5. The ability to turn off graphic (ie: particles, sky, clouds, water) is included in AccessGlobe under Advance in the menu bar. How important is this feature for accessibility?

Least Important   Important   Neutral   Very Important   Most Important   N/A

6. Note cards can be provided by objects in second life that include descriptive and functional descriptions of items. This has can be seen while using the Virtual Guidedog and interacting with a Marco Polo enabled device. How much of an improvement is this for accessibility in virtual worlds?

Least Important   Important   Neutral   Very Important   Most Important   N/A

6. The AccessGlobe viewer has several skins developed by the Phoenix team, in particular the firebird skin offers good contrast as does the silver skin developed by Linden Labs. How important is a high-contrast viewer skin for accessibility?

Least Important   Important   Neutral   Very Important   Most Important   N/A



7. User help is available in the viewer or as a web interface. How important is this feature for accessibility?

Least Important   Important   Neutral   Very Important   Most Important   N/A

8-a. Alternative input devices are an important part of accessibility. In virtual worlds viewers currently allows for Joysticks and devices like the SpaceMouse™. How important do you feel this is to accessibility in virtual worlds?

Least Important   Important   Neutral   Very Important   Most Important   N/A

8-b. Would you find it important to include other alternative input devices into the virtual word and if so what devices?

9-a. A few alternative technologies do exist for interaction with the virtual world environment. If you use any alternative technology to access virtual world content please indicate all that apply:

Screen reader   iPhone/ iPad appmodified   3D viewer  
( provide name)   other (please indicate)

9-b. What features does the alternative technology enhance access to the virtual world content? How does it assist you better?

10. Based on your experience with previous 3D virtual world viewers, do you consider the viewers to meet acceptable accessibility specifications and conventional guidelines?

Do not meet guidelines   Somewhat   meets guidelines   Meet guidelines   N/A

11. Based on your experience with previous 3D virtual world viewers, do you consider the AccessGlobe features to improve accessibility?

Does not improve   Slightly improves   Improves   Greatly Improves



12. Based on your experience with virtual world technology, what are ways the technology can be improved to meet accessibility?

### Web 2.0 Content Accessibility Guidelines

The Web 2.0 Slide Presenter displays images as slides outside the 3D virtual world environment. When answering the following questions, please refer to your use of the Web 2.0 tool provided during the demonstration.

13. Did you find the Web 2.0 tool text alternatives for any non-text content (PowerPoint slides or images useful as an alternative for virtual content)?

Not useful	Somewhat useful	Useful	Very Useful	N/A
------------	-----------------	--------	-------------	-----

14. Did the Web 2.0 Slide Presenter provide improved accessibility over viewing in the virtual environment?

Not useful	Somewhat useful	Useful	Very Useful	N/A
------------	-----------------	--------	-------------	-----

15. Did the chat text output provide improved accessibility over viewing in the virtual environment?

Not useful	Somewhat useful	Useful	Very Useful	N/A
------------	-----------------	--------	-------------	-----

16. Did the chat text relay from the website into the virtual world provide improved accessibility?

Not useful	Somewhat useful	Useful	Very Useful	N/A
------------	-----------------	--------	-------------	-----

17. Does the Web 2.0 Slide Presenter chat text log provide opportunities for improved accessibility?

Not useful	Somewhat useful	Useful	Very Useful	N/A
------------	-----------------	--------	-------------	-----

18. Does the Web 2.0 Slide Presenter alternate text image tags opportunities for improved accessibility?



Not useful	Somewhat useful	Useful	Very Useful	N/A
------------	-----------------	--------	-------------	-----

19. Does the Web 2.0 Slide Presenter alternate green text and preceding by the characters "...".output by the tool provide easier identification and opportunities for improved accessibility?

Not useful	Somewhat useful	Useful	Very Useful	N/A
------------	-----------------	--------	-------------	-----

### Guidelines for Facilitators and Presenters

20. The ability for users to add descriptive label for all objects and longer descriptions for posters and slides containing text in image format is included in the Web 2.0 Slide Presenter tool. How much does this feature improve accessible presentations?

Least improved	Improved	Neutral	Very Improved	Most Improved
N/A				

21. YouTube video provides automated captioning for videos. While this does not translate when displaying media in Second Life, links can be provided so that the user can choose to view the content with captions in the YouTube interface. How much of an improvement is this to accessibility in the virtual world?

Least improved	Improved	Neutral	Very Improved	Most Improved
N/A				

22. Is the Web 2.0 Slide Presenter useful in improving the ability for educators to make content appear and operate in predictable ways; thereby improving accessible instruction?

Least improved	Improved	Neutral	Very Improved	Most Improved
N/A				

23. Is the Web 2.0 Slide Presenter useful in helping structure content to avoid and correct mistakes for educators and students?

Not useful	Somewhat useful	Useful	Very Useful	N/A
------------	-----------------	--------	-------------	-----



## Enhancing Accessibility Guidelines

Each tester has unique accessibility needs. While AccessGlobe makes some accessibility modifications, your input for many of the questions below can expand the development of accessibility features. Please answer any questions in which you feel like you can contribute ideas or experience.

24. Do you feel that a web browser alternative to a standard viewer is important to accessibility in the virtual world?

Least Important   Important   Neutral   Very Important   Most Important  
N/A

25. What importance would you put on the accessibility of a web browser based viewer?

Least Important   Important   Neutral   Very Important   Most Important  
N/A

26. Based on your experience with virtual world viewers, in what ways can AccessGlobe be modified to support a range of input devices?



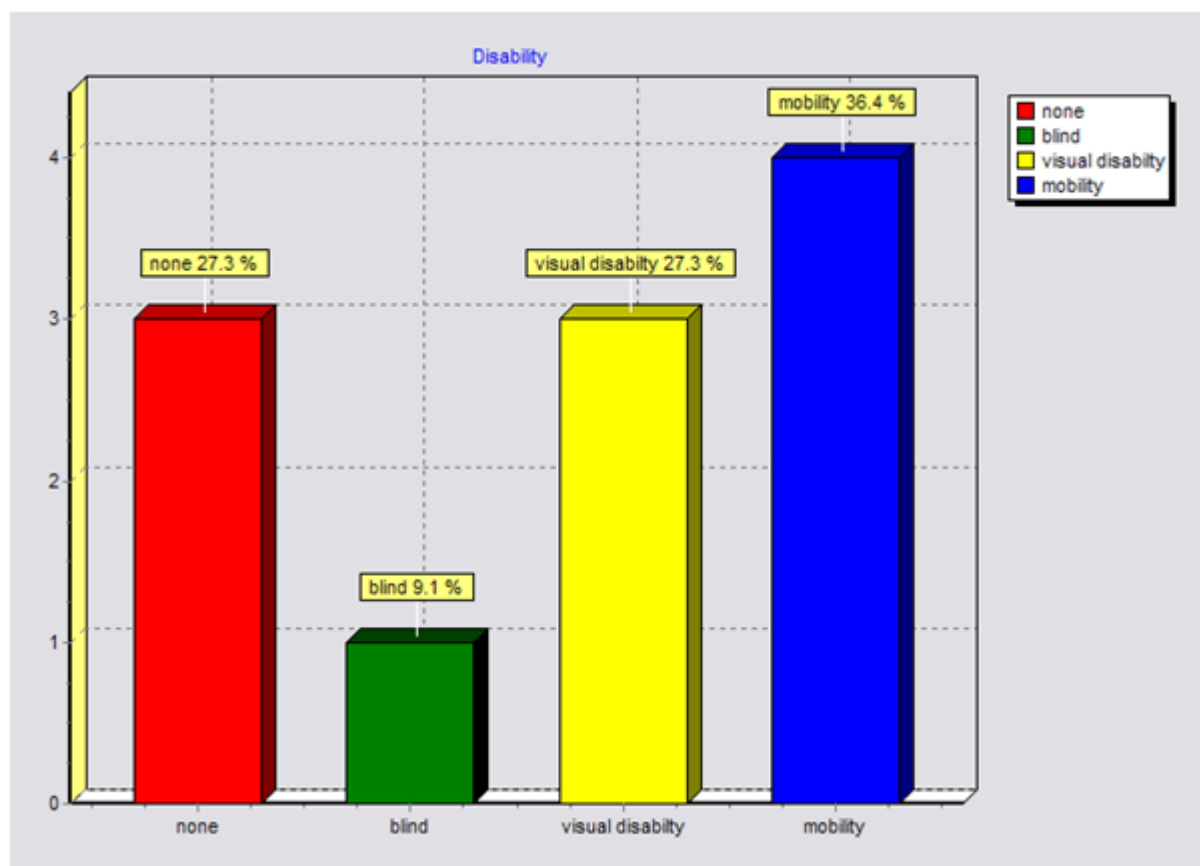


## Appendix 8: Detailed findings from analysis of user feedback

### Demographic Information

**Table 32:** Disability of participants who undertook accessibility testing

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	1 none	3	27.3	27.3	27.3
	2 blind	1	9.1	9.1	36.4
	3 visual disability	3	27.3	27.3	63.6
	4 mobility	4	36.4	36.4	100.0
	Total	11	100.0	100.0	

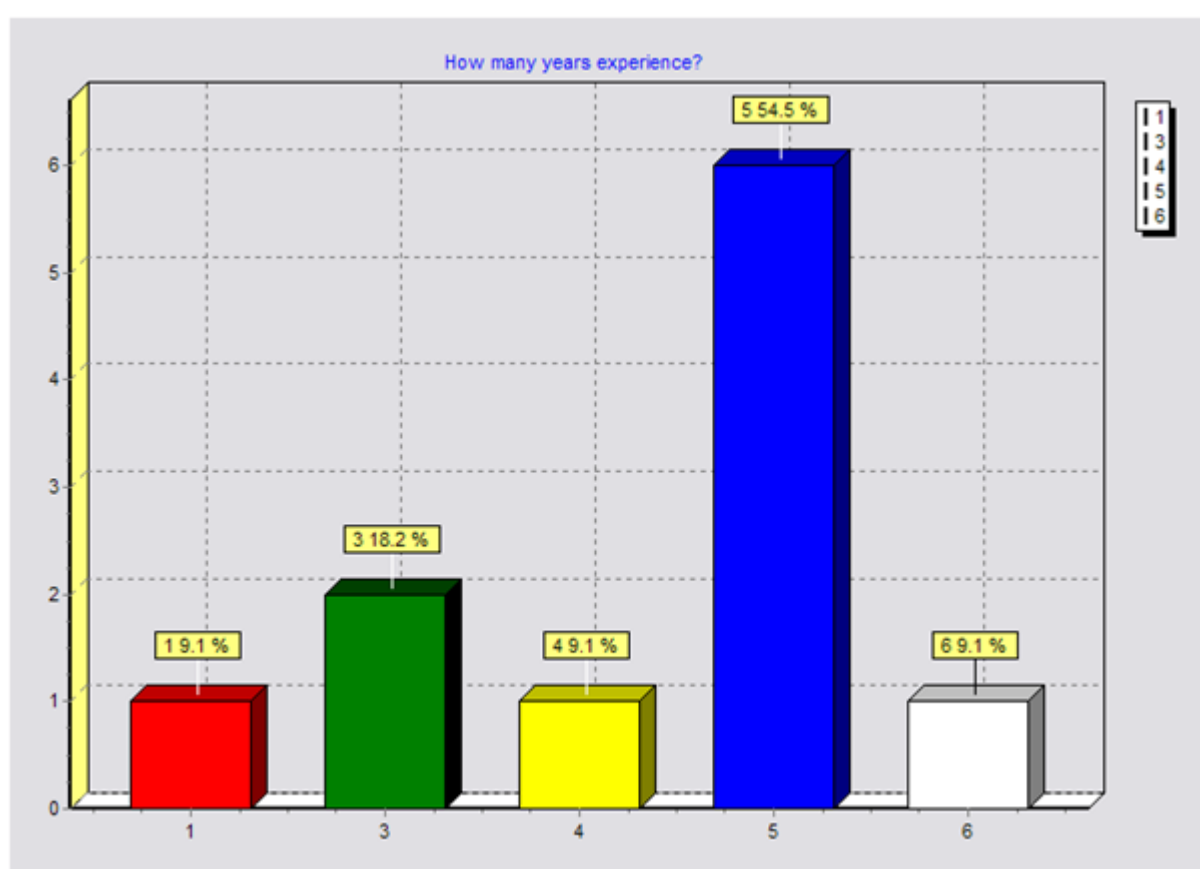


**Figure 35:** Graphical representation showing disability of participants who undertook accessibility testing



**Table 33:** How many years experience in using 3DVEs did participants of the accessibility testing report?

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	1	1	9.1	9.1	9.1
	3	2	18.2	18.2	27.3
	4	1	9.1	9.1	36.4
	5	6	54.5	54.5	90.9
	6	1	9.1	9.1	100.0
	Total	11	100.0	100.0	



**Figure 36:** Graphical representation of the number of years of experience in 3DVEs participants of the accessibility testing reported



**Table 34:** Which 3DVEs participants of the accessibility testing report that they use

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid 3 iPhone/iPad	1	9.1	9.1	9.1
4 Second Life	5	45.5	45.5	54.5
7 Multiple	5	45.5	45.5	100.0
Total	11	100.0	100.0	

**Table 35:** What other technologies do participants of the accessibility testing report that they are using to access 3DVEs

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid 0 None	1	9.1	9.1	9.1
1 MaxVoice	1	9.1	9.1	18.2
3 iPhone/iPad Application	2	18.2	18.2	36.4
4 OnScreen Keyboard	1	9.1	9.1	45.5
5 Speech to Text	1	9.1	9.1	54.5
8 3D viewer	1	9.1	9.1	63.6
10 Magnifier and MaxVoice	1	9.1	9.1	72.7
11 Max, AccessGlobe, iPhone	2	18.2	18.2	90.9
13 Screen reader and accessglobe	1	9.1	9.1	100.0
Total	11	100.0	100.0	



**Table 36:** Input devices participants of the usability testing reported should be supported by 3DVEs

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	0 none	4	36.4	36.4	36.4
	4 on-screen-keyboard	1	9.1	9.1	45.5
	5 API standards	1	9.1	9.1	54.5
	8 All USB devices	2	18.2	18.2	72.7
	9 Mouth and text to speech	1	9.1	9.1	81.8
	10 Razer Hydra Sixaxis gaming system	1	9.1	9.1	90.9
	12 Braille kb and refreshable display	1	9.1	9.1	100.0
	Total	11	100.0	100.0	

**Table 37:** Features reported by participants of the accessibility testing reported would improve the accessibility of 3DVE viewers

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	2 More descriptive labels of visual elements	1	9.1	10.0	10.0
	3 APIs	1	9.1	10.0	20.0
	13 AV accessibility	1	9.1	10.0	30.0
	15 Customisable keys	2	18.2	20.0	50.0
	16 Common menus and contrast	1	9.1	10.0	60.0
	17 Integration and slim text	1	9.1	10.0	70.0
	18 Improved sensitivity mouse	1	9.1	10.0	80.0
	19 improve information of hovers	1	9.1	10.0	90.0
	20 Text to Speech, speech to text, improved mob, help	1	9.1	10.0	100.0
	Total	10	90.9	100.0	
Missing	System	1	9.1		
Total		11	100.0		



**Table 38:** Other strategies proposed by participants of the accessibility testing that presenters can adopt to improve accessibility of 3DVEs

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	1 Better use of sound scape	1	9.1	10.0	10.0
	2 Notes for voice text	1	9.1	10.0	20.0
	3 Option to register for events	1	9.1	10.0	30.0
	4 Support available	1	9.1	10.0	40.0
	7 Allow time for all learners	1	9.1	10.0	50.0
	13 minimise distractions, volunteer, IRC	1	9.1	10.0	60.0
	14 Apply as in real world access	1	9.1	10.0	70.0
	15 live descriptions	1	9.1	10.0	80.0
	16 note givers, colour contrast, allow time	1	9.1	10.0	90.0
	17 text only available to screen readers	1	9.1	10.0	100.0
	Total	10	90.9	100.0	
Missing	System	1	9.1		
Total		11	100.0		

**Table 39:** Importance of Web browser based viewers to 3DVEs reported by participants of the accessibility testing

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	1 Not Very Important	2	18.2	18.2	18.2
	2 Important	3	27.3	27.3	45.5
	4 Very Important	5	45.5	45.5	90.9
	5 Essential	1	9.1	9.1	100.0
Total		11	100.0	100.0	



## Appendix 9: Guidelines for academics

Guideline 1: Consider the timing of meetings in the virtual world so that students in different time zones have an equal opportunity to participate.

Guideline 2: Be specific in the level of skill development students are required to achieve in the virtual world. Clearly state whether students are required to have build skills or whether they are using facilities developed by others. If students are required to build in the virtual world, ensure that they have access to sufficient training opportunities.

Guideline 3: Ensure that the learning activities, assessment items and learning objectives are aligned and clear to students. Explore the use of learning activities that maximise the unique affordances of 3DVLEs and avoid replicating activities that might be better conducted in the physical classroom or using other technologies in the case of distance education.

Guideline 4: In general, researchers should ensure informed consent is obtained from avatars participating in research. Informed consent may take the form of a response to notecards provided to the avatar, but there may be alternatives. Human research ethics committees need to understand the conventions of the contexts of particular parts of virtual worlds if they are to assess the appropriateness of different approaches to informed consent. No one approach will be appropriate to all research in a virtual world.

Guideline 5: Consent to undertake research should also be obtained from the proprietor of the platform. Researchers who enter virtual worlds as participants will be expected to comply with the End User License Agreement and/or the Terms of Service Agreement generated by the virtual world provider. They may also have to consult the owner of any virtual real estate such as an island.

Guideline 6: Ensure participants in research understand the limitations to the confidentiality that can be assured by the researcher.

Guideline 7: As in the real world, researchers should attempt to anticipate the use that may be made of their data and consider strategies to mitigate risks and minimise harm.

Guideline 8: Universities should reflect on the extent to which their generic policies, including those relating to academic and student behaviour and academic integrity, fit the particular circumstances of virtual worlds. Until students become used to seeing virtual worlds as an extension of their university lives, students should be reminded about the operation of these policies at the beginning of units that make use of 3DVLEs.

Guideline 9: Assessors should build features into their assignments that promote academic integrity or reduce the possibilities of academic dishonesty.

Guideline 10: Course coordinators should ensure that students understand how to acknowledge the work of others in the virtual world, so that plagiarism does not occur through unfamiliarity with conventions.

Guideline 11: Where necessary, course coordinators need to be able to determine that the student is represented by the avatar they claim to be.

Guideline 12: Ensure students are advised either verbally or in writing about the code of conduct in the 3DVLE, which should relate as closely as possible to university policies about behaviour on campus.

Guideline 13: Staff member should regularly check sim to remove illegal or inappropriate content.

Guideline 14: Provide FAQs on what can and cannot be submitted, e.g. no content that





breaches copyright, privacy, harassment, discrimination, defamation, antispy or obscenity laws. Give examples of inappropriate content so students have context.

Guideline 15: The staff member should go through the terms of use of Linden Labs with the students in the first class and highlight the points made above. If possible these points could be put written in plain English and placed online in the unit guide so students and staff can refer to this again.

Guideline 16: Use text chat for student discussions or use group discussions as too many talking at once can become confusing. Rather than asking students to send material to each other, consider distribution for peer review to be coordinated by the facilitator.

Guideline 17: Teachers should also provide students with the option to attend synchronous classes conducted in the 3DVLE via the Web 2.0 interface if they are unable to access the 3DVLE due to disability related issues, slow bandwidth or limited technologies available to them.

Guideline 18: Ensure students understand the minimum technology required for them to undertake learning activities conducted in a 3DVLE.

Guideline 19: Provide students with the option to undertake alternative learning activities and assessment tasks if they are unable to access the required equipment.

Guideline 20: Ensure IT policies do not disadvantage students enrolled in courses requiring access to 3DVLEs. All students undertaking studies in 3DVLEs need access to the appropriate equipment on campus.

Guideline 21: Install AccessGlobe as an alternative viewer for students who find difficulty accessing the virtual world using standard viewers. Provide students with the option to attend synchronous classes conducted in the 3DVLE via the Web 2.0 interface if they are unable to access the 3DVLE due to disability related issues, slow bandwidth or limited technologies available to them.

Guideline 22: Provide note card descriptions to students 'in-world'.

Guideline 23: Conduct class sessions using both text chat and voice.

Guideline 24: If possible, arrange for a live captioner to be available for classes undertaken in the 3DVLE by students who are deaf.

Guideline 25: Ensure that text transcriptions for voice and audio are provided to students.

Guideline 26: Provide an option for users to register for events and indicate their accessibility needs in advance.

Guideline 27: Ensure support (for example mentors) is available during classes.

Guideline 28: Pace the learning activities to accommodate learners with diverse needs.

Guideline 29: Minimise distractions in the virtual space.

Guideline 30: Provide an Internet Relay Channel (IRC) so that users who cannot participate 'in-world' can participate via IRC (note the Web 2.0 interface accommodates this option).

Guideline 31: Ensure all videos displayed 'in-world' include captions.

Guideline 32: Consider designing the virtual space in a way that reflects accessible spaces in the physical world.

Guideline 33: As in the real world, researchers should attempt to anticipate the use that may be made of their data and consider strategies to mitigate risks and minimise harm.

Guideline 34: Universities are advised to keep third-party material behind university firewalls if they are to rely on existing licences.



Guideline 35: Universities can link to material made available under existing licences if that material is made available and controlled through existing password authenticated links and that the material linked to resides either on a licenced access site or university repository.

Guideline 36: Linking to content not controlled by a university may put universities at risk as they may be viewed as infringing copyright by communicating infringing material to their students.

Guideline 37: Robust administrative arrangements need to be in place to ensure that only currently enrolled students or employed staff have access to third-party copyrighted material.

Guideline 38: University Copyright Officers need to be able to monitor content on 3D virtual servers in line with the recommendations of internal university audit report recommendations for online copyright.

Guideline 39: The staff member should go through the terms of use of Linden Labs with the students in the first class and highlight the points made above. If possible these points could be put written in plain English and placed online in the unit guide so students and staff can refer to this again.

Guideline 40: Student should sign a statement confirming that they understand the risks of using Second Life.

Guideline 41: Staff and students must be made aware that they cannot add, reuse or modify existing copyright works to add to Second Life. This is so even when their use of that material might be considered fair under fair dealing or in the case of the staff member, use for educational purposes under the CAL licence. The staff member should dedicate some part of the first class talking about this restriction with a couple of examples of what students can and cannot do.

Guideline 42: Clarify IP ownership issues. Do the students own copyright in their coursework? Does the staff member? Remind students of the Second Life reuse policy.

Guideline 43: Restrict access to the island to students in the unit only.

Guideline 44: Staff member should regularly check sim to remove illegal or inappropriate content.

Guideline 45: Get students to run content past the staff member before they add it to the island.

Guideline 46: Provide FAQs on what can and can't be submitted e.g. no content that breaches copyright, privacy, harassment, discrimination, defamation, antispyam or obscenity laws. Give examples of inappropriate content so students have context.





Promoting excellence in higher education

PO Box 2375 Strawberry Hills NSW 2012 Australia

Telephone 02 8667 8500 Facsimile 02 8667 8515

[www.altc.edu.au](http://www.altc.edu.au)

ABN 30 109 826 628